CULTURAL RESOURCES SURVEY OF THE CAMPBELL TRACT, CHARLESTON COUNTY, SOUTH CAROLINA

CHICORA RESEARCH CONTRIBUTION 442

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Prepared By:
Michael Trinkley, Ph.D., RPA
and
Sarah Fick

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Chicora Foundation, Inc.
PO Box 8664
Columbia, SC 29202-8664
803/787-6910
Email:chicora@earthlink.net
www.chicora.org

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ABSTRACT

This study reports on an intensive cultural resources survey of a nearly 3,000 acre tract (1,416 acres of wetland and 1,584 acres of upland), located in Charleston County, South Carolina. The work was conducted to assist Mr. Walt Martin of Associated Developers, Inc. comply with Section 106 of the National Preservation Act and the regulations codified in 36CFR800.

A decision was made by the property owner not to submit the report for review. Associated Developers lost their option on the property and no further management activities were conducted. In January 2016, Long Savannah Land Company renewed the project, requesting that Chicora make minimal revisions to this cultural resources survey and submit the document for review by the State Historic Preservation Office. As a result, this study is provided largely as it was completed a decade ago.

The tract, which is located in the town of Red Top, will be developed for single family occupancy. The surrounding area is being quickly developed with neighborhoods and commercial structures.

The proposed undertaking will require the clearing of the tract, followed by construction of various infrastructure elements, such as roads, stormwater drainage, and utilities. Individual lot construction will involve grading, additional utility construction, and subsequent building of structures. These activities have the potential to affect archaeological and historical sites and this survey was conducted to identify and assess archaeological and historical sites that may be in the project tract. For this study, an area of potential effect (APE) 0.5 mile from the proposed tract was assumed.

An investigation of the archaeological site files at the South Carolina Institute of Archaeology and Anthropology identified seven (38CH258, 38CH486, 38CH981, 38CH1962-1964, and 38CH2019) previously recorded sites in the APE.

Site 38CH258 is a collection of bottle fragments possibly associated with the Bradley Bridge Crossing; site 38CH486 is possibly the location of a seventeenth century settlement according to the seventeenth century Thornton-Morden map; site 38CH981 is a scatter of historic artifacts; site 38CH1962 and 38CH1963 are late nineteenth to early twentieth century tenant houses; 38CH1964 is the nineteenth to early twentieth century Bradley Bridge approach and barge landing; and 38CH2019 is a historic barge site. No eligibility has been recommended for 38CH259 or 38CH486. The remaining five sites (38CH981, 38CH1962-1964, and 38CH2019) were all recommended not eligible for the National Register of Historic Places.

The S.C. Department of Archives and History GIS was also consulted to see if any National Register of Historic Places sites were in the vicinity of the project area. None were identified. A county-wide architectural survey was performed in 1992, so these records are thought to be complete (Fick 1992).

The GIS did, however, show the possible location of Battery Bulow, recorded during a survey of Civil War Fortifications (Trinkley and Fick 2000).

The archaeological survey of the tract incorporated shovel testing at 100-foot intervals

on transects that were placed at 100-foot intervals along the roads running throughout the tract. All shovel test fill was screened through ¼-inch mesh and the remains were recorded. A total of 2,348 shovel tests were excavated along 288 transect lines.

As a result of these investigations, ten sites (38CH2025 and 38CH2081-2089) were identified. Site 38CH2025 is the Bulow Cemetery, which is recommended eligible for the National Register. Site 38CH2081 consists of the remains of structures associated with the nineteenth to twentieth century Bulow Mines that is potentially eligible for the National Register. Site 38CH2082 is the remains of nineteenth to twentieth century structures that is recommended not eligible for the National Register for its lack of integrity and inability to address significant research questions. Site 38CH2083 consists of remains dating from the eighteenth to nineteenth century that is recommended not eligible for the National Register for its lack of integrity. Site 38CH2084 is the nineteenth to twentieth century mining village associated with the Bulow Mines and is potentially eligible for the National Register. Site 38CH2085 consists of the remains of late nineteenth century structures that are potentially eligible for the National Register. Site 38CH2086 are the remains of an eighteenth to nineteenth century settlement that is recommended not eligible for the National Register for its lack of integrity and sparse remains. Site 38CH2087 is a nineteenth to twentieth century domestic site that may be related to the Bulow Mines and is potentially eligible for the National Register. Sites 38CH2088 and 38CH2089 are eighteenth century settlements that are potentially eligible for the National Register.

Finally, it is possible that archaeological remains may be encountered in the project area during clearing activities. Crews should be advised to report any discoveries of concentrations of artifacts (such as bottles, ceramics, or projectile points) or brick rubble to the project engineer, who should in turn report the material to the State Historic Preservation Office or to Chicora Foundation (the process of dealing with late discoveries is discussed in 36CFR800.13(b)(3)). No construction should take place in the vicinity of these late discoveries until they have been examined by an archaeologist and, if necessary, have been processed according to 36CFR800.13(b)(3).

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INTRODUCTION

This investigation was conducted by Dr. Michael Trinkley of Chicora Foundation, Inc. for Mr. Walt Martin of Associated Developers, Inc. in Charleston, South Carolina. The work was conducted to assist Long Savannah Plantation, LLC with Section 106 of the National Historic Preservation Act and the regulations codified in 36CFR800.

The project site consists of a 3,000 acre tract (1,416 acres of wetland and 1,584 acres of upland) proposed to be used for residential development in the town of Red Top, South Carolina (Figure 1). The tract, irregular in shape, is in an area of Charleston County already seeing significant growth. To the southeast of the parcel there is an existing county landfill, while to the south and east there are existing developments. There is extensive residential development along Bees Ferry Road and extensive commercial development along US 17, both to the southeast of the study area.

The tract consists of low, level topography. A second growth of mixed pines and hardwoods dominates the upland vegetation, while much of the wetland is standing water and hardwood stands. To the west are the marshes and old rice fields of Rantowles Creek. Based on field investigations nearly 2,000 acres – or at least two-thirds of the study tract – have been mined for phosphates and subsequently logged. Other than the mine pits, most of the soil is poorly to very poorly drained with only a few areas of moderately well-drained soils.

While still in the planning stages, the property will likely include both medium and low density residential housing, as well as several community centers and other amenities. There are also plans to place significant portions of the property into conservation easements. This work will require the construction of utilities such as electrical lines, sewer, and water, as well as an expanded road system and possibly even connector routes. There will also be construction on the individual house lots. As with any development there is the possibility of increased short-term noise, traffic, and dust levels associated with construction activities. All have the potential to damage or otherwise affect cultural resources that may be present on the tract. This study, however, does not consider any future secondary impact of the project, including increased or expanded development of this section of Charleston County.

We were requested by Mr. Walt Martin of Associated Developers, Inc. to provide a proposal for a Cultural Resource Assessment (CRA) in July 2004. A proposal was provided in August 2004 and accepted on October 19, 2004. The CRA, which involved background investigations at the South Carolina Institute of Archaeology and Anthropology, the South Carolina Department of Archives and History, and the South Caroliniana Library, and subsequently one day in the field, was begun shortly thereafter.

The initial background investigations identified seven previously recorded sites in the 0.5 mile area of potential effects (APE). Site 38CH258 is a collection of bottle fragments possibly associated with the Bradley Bridge crossing; site 38CH486 is thought to be the location of a seventeenth century settlement based on the Thorton-Morden map; site 38CH981 is a scatter of historic artifacts; 38CH1962 and 38CH1963 are late nineteenth to early twentieth century domestic sites, perhaps tenant, logger, or phosphate worker houses; 38CH1964 is the nineteenth to early twentieth century Bradley Bridge approach and barge landing; and 38CH2019 are the remains of a

Figure 1. Vicinity of the project in southern Charleston County (basemap is USGS South Carolina 1:500,000).

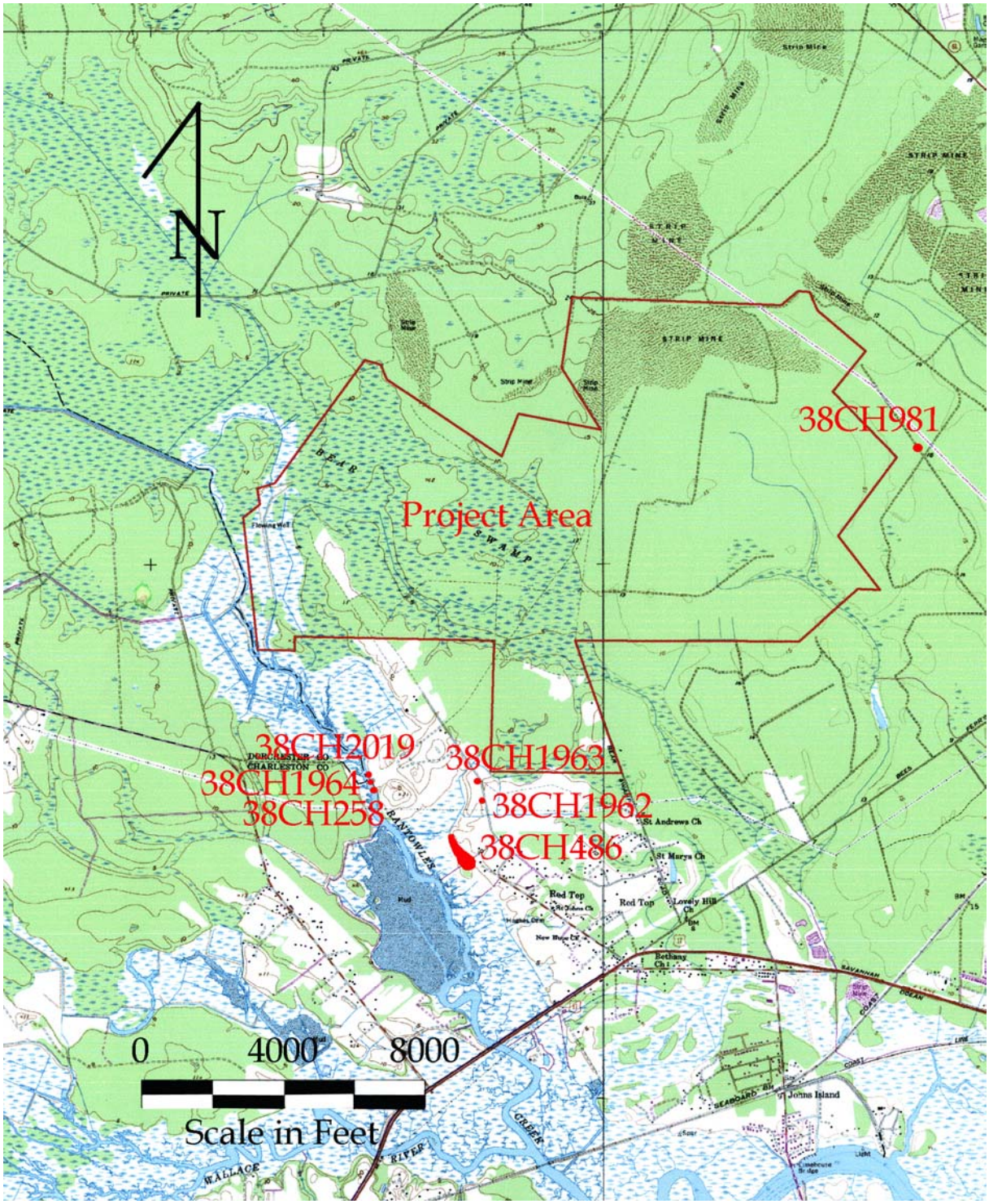


Figure 2. Portions of the USGS Ravenel and Johns Island topographic maps (1:48,000) showing the project area, study tract, and previously identified archaeological sites.

barge possibly associated with the 38CH1964 landing. No eligibility has been recommended for 38CH259 or 38CH486. The remaining five sites (38CH1981, 38CH1962, 38CH1963, 38CH1964, and 38CH2019) were all recommended not eligible for inclusion on the National Register – evaluations apparently concurred with by the State Historic Preservation Office.

The fieldwork for the CRA was performed on November 5, 2004 (see Trinkley 2004). During this assessment several structural remains, likely related to the late nineteenth and early twentieth century Bulow Phosphate Mines, were observed. Based on these findings, we concluded that the tract had a high potential for archaeological resources and an intensive study was recommended.

The State Historic Preservation Office concurred with this recommendation (Mr. Chad Long, letter dated September 16, 2005), suggesting that about 900 acres of the project area be investigated for subsurface remains. Other portions of the tract were to be examined using pedestrian survey techniques. The letter also specified that development effects be evaluated on the proposed expansion of the Ashley River Historic District.

A proposal for an intensive survey was supplied to Associated Developers on September 22, 2005. At the same time, Chicora Foundation was retained to determine the boundaries of the Bulow Cemetery (38CH2025, also known as Bulow Plum Patch Cemetery) located on the property. This work was performed on September 27-28, 2005 and the cemetery was found to contain at least 300 and likely as many as 600 burials in an area of about 4 acres (Trinkley 2005).

We also made several efforts to obtain additional information on the proposed Ashley River Historic District boundaries from the Historic Charleston Foundation, as well as gather further information concerning the historic research that had been conducted for the boundary modifications. The SHPO advised that the boundaries were still being determined and no final information on the District had yet been submitted (Mr. Chad Long, email dated October 18, 2005).

On January 23, 2006, our proposal for the intensive survey was accepted and the associated fieldwork took place from March 6 through April 5 by Ms. Nicole Southerland and Ms. Julie Poppell under the direction of Dr. Michael Trinkley. We discovered that no detailed phosphate mining context, suitable for the evaluation of archaeological research significance, was available. As a result, an effort was made during this project to prepare a context and that document is incorporated into this study report. Finally Ms. Sarah Fick prepared the historical overview of the study tract, incorporating a title search with more tract specific information concerning both agricultural activities and the subsequent phosphate mining by William Bradley. The results of the archaeological and historical investigations are included in this report.

NATURAL ENVIRONMENT

Physiography

Charleston County is located in the lower Atlantic Coastal Plain of South Carolina and is bounded to the east by the Atlantic Ocean and a series of marsh, barrier, and sea islands (Mathews et al. 1980:133). Elevations in the County range from sea level to about 70 feet above mean sea level (AMSL).

Seven major drainages are found in Charleston County. Four of these, the Wando, Ashley, Stono, and North Edisto, are dominated by tidal flows and are saline. The Wando forms a portion of the County's interior boundary northeast of Charleston, while the Ashley flows west of the peninsular city of Charleston. The three with significant freshwater flows are the Santee, which forms the northern boundary of the County; the South Edisto, which forms the southern boundary; and the Cooper, which bisects the County.

Because of the low topography, many broad, low gradient interior drains are present as either extensions of the tidal rivers or as flooded bays and swales. Extensions included Long Branch and Bear Swamp creeks that flow south into the Stono River and Bulls and Church creeks that flow east into the Ashley River.

Elevations in the project area range from about 5 to 15 feet AMSL. In general, the topography subtly slopes toward Bear Swamp in the western half of the project tract. In addition, the late nineteenth to early twentieth century phosphate mining that occurred on the property has destroyed much of the original landscape, creating an artificial ridge and trough topography that varies from extremely pronounced in the northeastern portion of the tract to less pronounced, at times even subtle, elsewhere on the property.

Geology and Soils

Coastal Plain geological formations are unconsolidated sedimentary deposits of very recent age (Pleistocene and Holocene) lying unconformably on ancient crystalline rocks (Cooke 1936; Miller 1971:74). The Pleistocene sediments are organized into topographically distinct, but lithologically similar, geomorphic units, or terraces, parallel to the coast. The sites are located in an area identified by Cooke (1936) as part of the Pamlico terrace, which includes the land between the recent shore and an abandoned shore line about 25 feet AMSL. Cooke (1936:7)

Figure 3. View of a phosphate mine pit in the project area.

notes that evidence of ancient beaches and swales can still be seen in the Pamlico formation and this likely contributed to the ridge and trough topography present in some areas.

Within the coastal zone the soils are Holocene and Pleistocene in age and were formed from materials that were deposited during the various stages of coastal submergence. The formation of soils is affected by this parent material (primarily sands and clays), the temperate climate, the various soil organisms, topography, and time.

The mainland soils are Pleistocene in age and tend to have more distinct horizon development and diversity than the younger soils of the sea and barrier islands. Sandy to loamy soils predominate in the level to gently sloping mainland areas. The island soils are less diverse and less well developed, frequently lacking a well-defined B horizon. Organic matter is low and the soils tend to be acidic. The Holocene deposits typical of barrier islands and found as a fringe on some sea islands, consist almost entirely of quartz sand, which exhibits little organic matter. Tidal marsh soils are Holocene in age and consist of fine sands, clay, and organic matter deposited over older Pleistocene sands. The soils are frequently covered by up to 2 feet of saltwater during high tides. Historically, marsh soils have been used as compost or fertilizer for a variety of crops, including cotton (Hammond 1884:510) and Allston mentions that the sandy soil of the coastal region "bears well the admixture of salt and marsh mud with the compost" (Allston 1854:13).

As the colony was being settled and promoted, the soils were described simply. John Norris told his readers in 1712:

> the Soil is generally Sandy, but of differing Colours, under which, Two or Three Foot Deep, is Clay of which good Bricks are made (Greene 1989:89).

In the last quarter of the eighteenth century, William DeBrahm's *Report* provides little more information, stating only that, "the Land near the Sea Coast is in general of a very sandy Soil" and noting that this soil "along the Coast has as yet not been able to invite the industrious to reap Benefit of its Capacity" (DeVorsey 1971:72).

By the nineteenth century, Robert Mills in his *Statistics of South Carolina* provides slightly more information concerning the current understanding of the soils:

> Lands here [in Charleston District] may be viewed under six divisions in respect to quality; 1st, Tide swamp, 2d, Inland swamp; 3d, High river swamp (or low ground commonly called second low grounds); 4th, Salt Marsh; 5th, Oak and hickory high lands; and 6th, Pine barren. The tide and inland swamps are peculiarly adapted to the culture of rice and hemp; they are very valuable, and will frequently sell for $100 an acre; in some instances for more. The high river swamps are well calculated for raising hemp, indigo, corn, and cotton; and where secured from freshets, are equally valuable with the tide lands. The oak and hickory highlands are well suited for corn and provisions, also for indigo and cotton. The value of these may be stated at from ten to twenty dollars per acre. The pine barrens are not worth more than one dollar an acre (Mills 1972:442-443[1826]).

Even the detail of this account, however, fails to provide a very clear picture of the soils in St. Andrews Parish where the soils were low and commonly interspersed with galls or small inland swamps. Here the property, even the supposedly

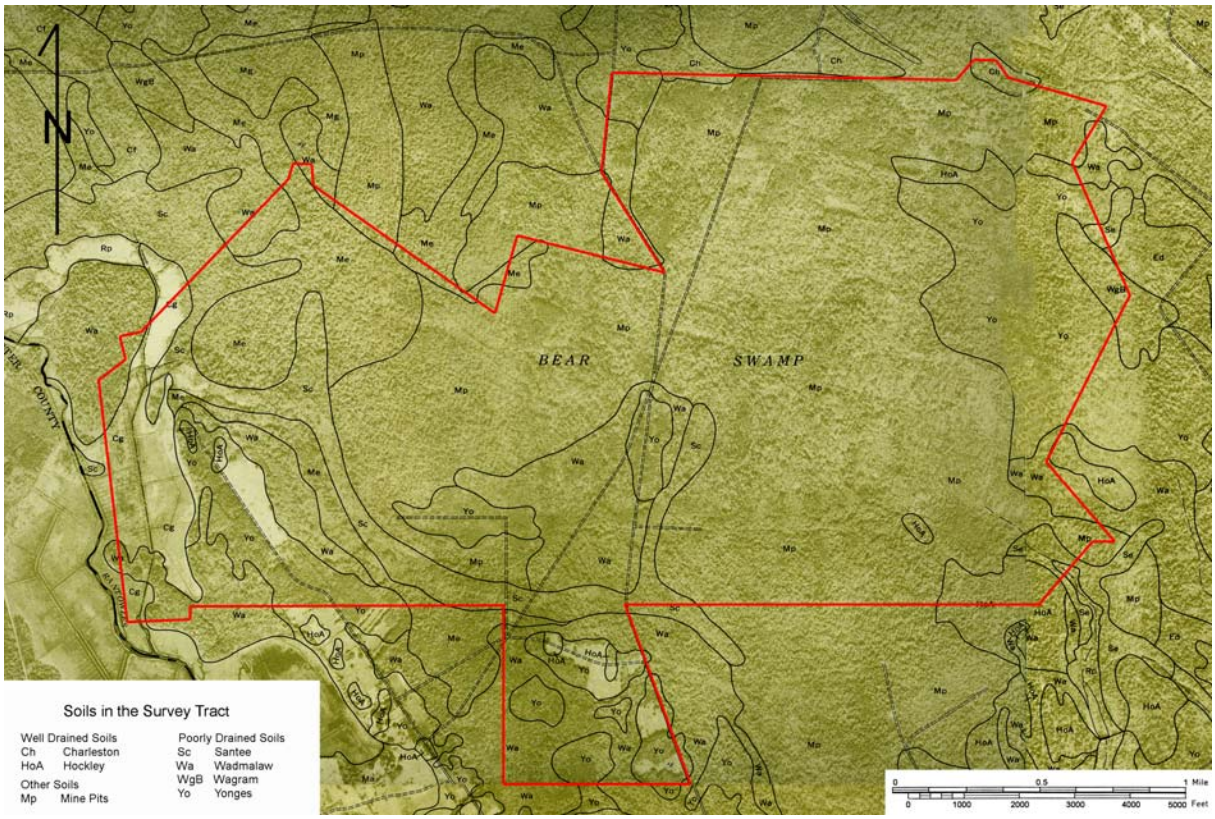


Figure 4. Soil map showing the study tract.

good hickory and oak lands, was poorly drained.

A number of period accounts discuss the importance of soil drainage. Seabrook, for example, explained in 1848:

> Subsoil so close as to be impervious to water; so that the excess of the rains of winter cannot sink. Nor can it flow off, because of the level surface . . . . The land thereby is kept thoroughly water-soaked until late in the spring. The long continued wetness is favorable only to growth of coarse and sour grasses and broom sedge . . . acid and antiseptic qualities of the soil . . . sponge-like power to absorb and retain water . . . is barren, (for useful crops) from two causes – excessive wetness and great acidity. The remedies required are also two; and neither alone will be of the least useful effect, with the other also. Draining must remove the wetness – calcareous manures the acidity (Seabrook 1848:37).

A somewhat similar account would still be provided by Hammond in the postbellum:

> Drainage . . . has of necessity always been practiced to some extent. The remarkably high beds on which cotton is planted here, being from 18 inches to 2 feet high, subserve this purpose. The best planters have long had open drains through their fields. These were generally made by running

> two furrows with a plow and afterward hauling out the loose dirt with a hoe, thus leaving an open ditch, if it be so termed, a foot or more in depth (Hammond 1884:509).

The number of drainages still found offers mute testimony to the problems planters encountered on these soils and their efforts to make the land productive. These problems have also been briefly mentioned by Hilliard, who comments that soils in the region were, "seldom well enough drained for most crops" (Hilliard 1984:11).

Seven soil types are found in the survey area including two moderately well drained soils, Charleston loamy fine sand and Hockley loamy fine sand, and four poorly to very poorly drained soils including Meggett clay loam, Santee clay loam, Wadmalaw fine sandy loam, and Yonges loamy fine sand. In addition about two thirds of the tract is classified as mine pits – area of phosphate mining. At the western portion of the tract are old rice fields, consisting of Capers silty clay loam soil.

Very few areas of moderately well drained soils are found, but where present the Charleston soils have an Ap horizon of dark brown (10YR3/3) loamy fine sand to 0.7 foot in depth over a yellowish brown (10YR5/4) loamy fine sand to 1.3 feet in depth. The Hockley soils have an Ap horizon of dark grayish brown (10YR4/2) loamy fine sand to 0.8 foot in depth over a light yellowish brown (10YR6/4) loamy fine sand to just over 1.0 foot in depth.

The poorly drained soils are all characterized by reduced soils. The Meggett Series has an A horizon of very dark grayish brown (10YR3/2) loam to 0.3 foot over a gray (10YR5/1) clay loam to 1.2 feet in depth. Santee soils have an A horizon of black (N1/0) loam over a black (N1/0) clay loam to 1.2 feet in depth. Wadmalaw soils have an A horizon of black (10YR2/1) fine sandy loam to 0.4 foot in depth over a very dark gray (10YR3/1) fine sandy loam to 0.8 foot in depth. Yonges soils have an Ap horizon of dark grayish brown (10YR4/2) loamy fine sand to 0.9 foot in depth over a light brownish gray (10YR6/2) loamy fine sand to 1.2 feet in depth. All of these soils, except the Yonges Series, have seasonal high water tables from the surface to a maximum depth of 2 feet (the Yonges soils have a seasonal water table from 1-2 feet below the surface). These high water tables were observed on site, as many shovel tests within a few hours of being excavated had partially filled with water, even during relatively dry periods.

Many of the mine pits were filled with water during the survey, but the areas that appear to have been hand mined (as opposed to using

Figure 5. View of wetland in the project area.

equipment such as steam shovels), produced a clay soil only an inch or two below the surface. The soil profiles were found to be an excellent indicator of previous disturbance.

Capers soils are found on the tidal flats, so no shovel testing was performed in this area, although a typical profile would consist of a dark gray (5Y4/1) silty clay loam to 0.4 foot in depth over a dark grayish brown (2.5Y4/2) silty clay to 1.5 feet in depth.

If only identifiable soil types are considered (i.e., the mine pits are excluded from consideration), well drained soils comprise only 6.4% of the parcel, while the poorly to very poorly drained soils account for the remaining 93.6% of the tract. This suggests that the historic plantation may have been limited in the crops that it could produce – both subsistence crops and cotton would have required extensive ditching, as well as banking to keep the soils dry. These would likely not have been considered especially good or profitable upland soils. It is likely that the rice fields along Rantowles Creek were of far greater value to the planter once they were appropriate banked and protected from flood tides.

Climate

The weather was all-important in Colonial society, affecting the crops that in turn affected trade and wealth. Just as importantly, the Carolina climate affected, usually for the worse, the planter's health. Greene notes that:

> the prospects of obtaining wealth with ease . . . meant little in a menacing environment, and both Nairne and Norris took pains to minimize the unpleasant and dangerous features that already had combined to give South Carolina an ambiguous reputation. They had to admit that throughout the summer temperatures were "indeed troublesome to Strangers." But they contended that settlers had quickly found satisfactory remedies in the form of "open airy Rooms, Arbours and Summer-houses" constructed in shady groves and frequent cool baths and insisted the discomfitures of the summers were more than offset by the agreeableness of the rest of the seasons. [They also suggested] that ill-health was largely limited to newcomers be-fore they were seasoned to the climate, to people who insisted in living in low marshy ground, and to those who were excessive and careless in their eating, drinking, and personal habits. "If temperate," they asserted, those who lived on "dry healthy Land," were "generally very healthful" (Greene 1989:16).

While making for good public relations, the reality was far different. Roy Merrens and George Terry (1989) found that in Christ Church Parish, 86% of all those whose births and deaths are recorded in the parish register, died before the age of twenty. Equally frightening statistics have been compiled by John Duffy (1952), who found that the average European could expect to live to the age of about 30 in South Carolina during the first quarter of the eighteenth century. Yellow fever, smallpox, diphtheria, scarlet fever, malaria, dysentery all were at home in Carolina. Using the Society for the Propagation of the Gospel (SPG) records, Duffy found that from 1700 to 1750, 38% of the missionaries either died or were compelled to resign because of serious illness within the first five years of their arrival. Within 10 years of their arrival, 52% had died or resigned because of their health. After 15 years in the colony, the combined death toll and resignations from sickness reached 68% -- two out of every three missionaries.

African Americans fared no better. Frank Klingberg (1941:154), using SPG records found that in a single four month period over 400 slaves died of "distemper." William Dusinberre, exploring rice plantations along the Carolina coast, entitled one of his chapters "The Charnel House" – a reference to the extraordinary morbidity of African Americans on rice plantations. He reports that on some plantations the child mortality rate (to age sixteen) was a horrific 90% (Dusinberre 1996:51), while the probable average for rice plantations was around 60% (Dusinberre 1996:239). Cotton plantations – that were probably most numerous in Christ Church – were healthier, but even there fully a third of all slave children did not live to see their sixteenth birthday.

Beginning in the last third of the eighteenth century the life expectancy began to increase. Merrens and Terry suggest that this was the result of the occupants beginning to understand the cause of malaria:

> During the middle of the eighteenth century South Carolinian's perception of the wholesome environment of the lowcountry swamps began to change. People no longer preferred these areas on the score of health as a place of summer residence. Instead, residents began to view the lowcountry as fostering both mosquitoes and death (Merrens and Terry 1989:547).

Perhaps most importantly it is about this time when we also see the planter move his residence from the swamp edge (where he could easily oversee both slaves and crops) to higher, sandier locations. Slave settlements, too, appear to move to somewhat drier and healthier environs.

The Charleston climate, with its moderate winters and long, hot summers, affected not only the health of the populations and the crops grown, it also influenced the politics of Carolina. The summer climate of Carolina, while causing the Barbadian immigrants to feel that they had resettled in the tropics, also convinced most that slavery was inevitable. Not only was slavery the accepted order to the planters from Barbados, Jamaica, Antique, and St. Kitts, it seemed impossible for white Englishmen to work in the torrid heat – making African American slaves that much more essential (Donnan 1928). In 1720 St. Andrews was the most populous of the 11 parishes, containing 310 whites and 2,493 African American slaves. Only three parishes, St. James Goose Creek, St. Johns, and St. Pauls, had a higher proportion of slaves (BPRO Transcripts, vol. 9, pg. 23, March 14, 1720).

Floristics

The survey area exhibits three major ecosystems: the maritime forest ecosystem, which consists of the upland forest areas, the palustrine ecosystem, which consists of essentially fresh water, non-tidal wetlands, and the riverine ecosystem, which is derived from salt water and is characterized by a tidal influence (Sandifer et al. 1980:7-9).

The maritime forest ecosystem has been found to consist of five principal forest types, including the Oak-Pine forests, the Mixed Oak Hardwood forests, the Palmetto forests, the Oak thickets, and other miscellaneous wooded areas (such as salt marsh thickets and wax myrtle thickets).

Of these, the Oak-Pine forests are most common, constituting large areas of Charleston's original forest community. In some areas palmetto becomes an important sub-dominant. Typically these forests are dominated by the laurel oak with pine (primarily loblolly with minor amounts of longleaf pine) as the major canopy co-dominant. Hickory is present, although uncommon. Other trees found are the sweet gum and magnolia, with sassafras, red bay, American holly, and wax myrtle and palmetto found in the understory.

Mills, in the early nineteenth century, remarked that:

> South Carolina is rich in native and exotic productions; the varieties of its soil, climate, and geological positions, afford plants of rare, valuable, and medicinal qualities; fruits of a luscious, refreshing, and nourishing nature; vines and shrubs of exquisite beauty, fragrance, and luxuriance, and forest trees of noble growth, in great variety (Mills 1972:66).

The loblolly pine was called the "pitch or Frankincense Pine" and was used to produce tar and turpentine; the longleaf pine was "much used in building and for all other domestic purposes;" trees such as the red bay and red cedar were often used in furniture making and cedar was a favorite for posts; and live oaks were recognized as yielding "the best of timber for ship building;" (Mills 1972:66-85). Mills also observed that:

> in former years cypress was much used in building, but the difficulty of obtaining it now, compared with the pine, occasions little of it to be cut for sale, except in the shape of shingles; the cypress is a most valuable wood for durability and lightness. Besides the two names we have cedar, poplar, beech, oak, and locust, which are or may be also used in building (Mills 1972:460).

The "Oak and hickory high lands" according to Mills were, "well suited for corn and provisions, also for indigo and cotton" (Mills 1972:443). The value of these lands in the mid-1820s was from $10 to $20 per acre, less expensive than the tidal swamp or inland swamp lands (where rice and, with drainage, cotton could be grown).

Today, virtually all of the site area's higher ground evidences some form or another of disturbance. Phosphate mining has destroyed about two-thirds of the project area, and was followed by logging which produced additional damage in some areas. The southern portion of the tract was used as a gravel pit. However, much of the property has grown up in a second growth of pines and hardwoods. The mine pits have become wetland areas with many exhibiting hardwood stands.

PREHISTORIC AND HISTORIC BACKGROUND

Previous Research

Numerous projects have taken place in vicinity to the current survey area, including several by Chicora that at least briefly explore the phosphate industry (see Southerland et al. 2004a and 2004b). A report was also produced that included the industrial component of the Bulow Mines, about 2,000 feet to the southwest on Rantowles Creek (Sipes and Hendrix 2002). Chicora's CRA for the study tract also briefly discussed the importance of research associated with the phosphate industry in South Carolina (see Trinkley 2004) and how the research might relate to the Bulow Mines tract.

At least one historic context (Fletcher et al. 2003) for evaluating phosphates is available, based on the examination of the Ashley Phosphate Co. and Bulwinkle Works. Several research topics are suggested, all largely historical. Their conclusions are indefinite: "archaeologically, the value of phosphate and fertilizer production facility sites is not yet known" (Fletcher et al. 2003:114). However, some of their archival findings suggest potentially fruitful areas for field work as well as further research. This current study expands and refines this initial effort.

Other projects in the vicinity include a survey of Civil War fortifications (Trinkley and Fick 2000), which identified the general location of the Confederate Bulow Battery.

Prehistoric Synopsis

A considerable amount of archaeology has been conducted in the Charleston area and these works should be consulted for broad overviews.

The Paleoindian period, lasting from 12,000 to perhaps 8,000 B.C., is evidenced by basally thinned, side-notched projectile points; fluted, lanceolate projectile points; side scrapers; end scrapers; and drills (Coe 1964; Michie 1977; Williams 1968). The Paleoindian occupation, while widespread, does not appear to have been intensive. Artifacts are most frequently found along major river drainages, which Michie interprets to support the concept of an economy "oriented towards the exploitation of now extinct mega-fauna" (Michie 1977:124).

The Archaic period, which dates from 8000 to about 1000 B.C., does not form a sharp break with the Paleoindian period, but is a slow transition characterized by a modern climate and an increase in the diversity of material culture. The chronology established by Coe (1964) for the North Carolina Piedmont may be applied with relatively little modification to the South Carolina coast. Archaic period assemblages, characterized by corner-notched and broad stemmed projectile points, are rare in the Sea Island region, although the sea level is anticipated to have been within 13 feet of its present stand by the beginning of the succeeding Woodland period (Lepionka et al. 1983:10).

To some the Woodland period begins, by definition, with the introduction of fired clay pottery about 2000 B.C. along the South Carolina coast. To others, the period from about 2500 to 1000 B.C. falls into the Late Archaic because of a perceived continuation of the Archaic lifestyle in spite of the manufacture of pottery. Regardless of the terminology, the period from 2500 to 1000 B.C. is well documented on the South Carolina coast and is characterized by Stallings (fiber-tempered) and Thom's Creek (sand or non-tempered) series pottery.

The subsistence economy during this early period on the coast of South Carolina was based

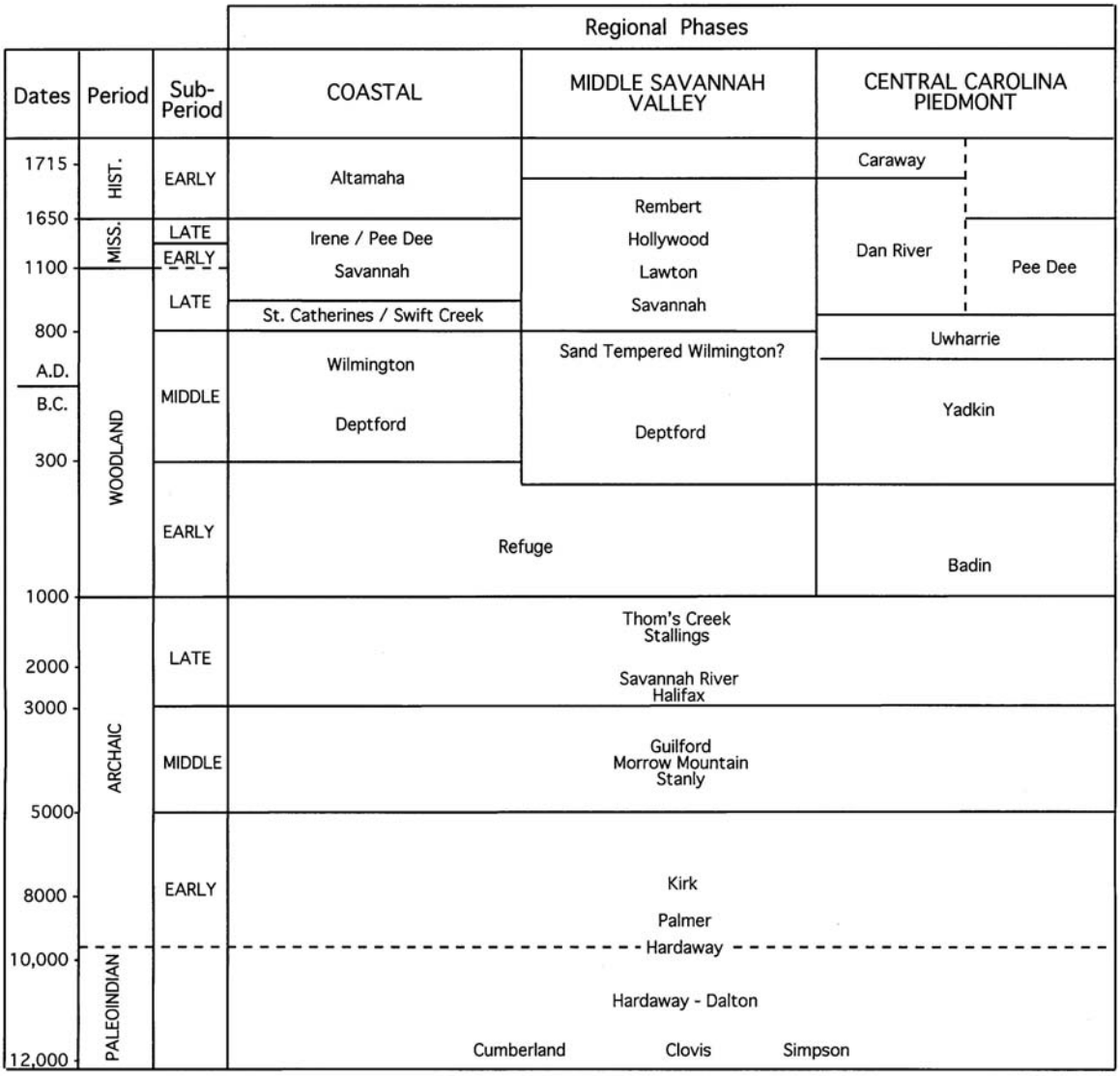


Figure 6. Generalized cultural sequence for South Carolina.

primarily on deer hunting, fishing, and shellfish collection, with supplemental inclusions of small mammals, birds, and reptiles. Various calculations of the probable yield of deer, fish, and other food sources identified from shell ring sites such as Lighthouse Point on James Island to the west, also in Charleston County on James Island, indicate that sedentary life was not only possible, but probable.

Toward the end of the Thom's Creek phase there is evidence of sea level change, and a number of small, non-shell midden sites are found along the coast. Apparently the rising sea level inundated the tide marshes on which the Thom's Creek people relied.

The succeeding Refuge phase, which dates from about 1100 to 500 B.C., suggests fragmentation caused by the environmental changes (Lepionka et al. 1983; Williams 1968). Sites are generally small and some coastal sites

evidence no shellfish collection at all (Trinkley 1982). Peterson (1971:153) characterizes Refuge as a degeneration of the preceding Thom's Creek series and a bridge to the succeeding Deptford culture.

The Deptford phase, which dates from 1100 B.C. to A.D. 600, is best characterized by fine to coarse sandy paste pottery with a check stamped surface treatment. Also present are quantities of cord marked, simple stamped, and occasional fabric impressed pottery. During this period there is a blending of the Deptford ceramic tradition of the lower Savannah with the Deep Creek tradition found further north along the South Carolina coast and extending into North Carolina (Trinkley 1983).

The Middle Woodland period (ca. 300 B.C. to A.D. 1000) is characterized by the use of sand burial mounds and ossuaries along the Georgia, South Carolina, and North Carolina coasts (Brooks et al. 1982; Thomas and Larsen 1979; Wilson 1982). Middle Woodland coastal plain sites continue the Early Woodland Deptford pattern of mobility. While sites are found all along the coast and inland to the fall line, sites are characterized by sparse shell and few artifacts. Gone are the abundant shell tools, worked bone items, and clay balls. In many respects the South Carolina Late Woodland period (ca. A.D. 1000 to 1650 in some areas of the coast) may be characterized as a continuum of the previous Middle Woodland cultural assemblage.

The Middle and Late Woodland occupations in South Carolina are characterized by a pattern of settlement mobility and short-term occupations. On the southern coast they are associated with the Wilmington and St. Catherines phases, which date from about A.D. 500 to at least A.D. 1150, although there is evidence that the St. Catherines pottery continued to be produced much later in time (Trinkley 1981). On the northern coast there are very similar ceramics called Hanover and Santee.

The South Appalachian Mississippian period (ca. A.D. 1100 to 1640) is the most elaborate level of culture attained by the native inhabitants and is followed by cultural disintegration brought about largely by European disease. The period is characterized by complicated stamped pottery, complex social organization, agriculture, and the construction of temple mounds and ceremonial centers. The earliest coastal phases are named Savannah and Irene (A.D. 1200 to 1550). Sometime after the arrival of Europeans on the Georgia coast in A.D. 1519, the Irene phase is replaced by the Altamaha phase. Altamaha pottery tends to be heavily grit tempered, the complicated stamped motifs tend to be rectilinear and poorly applied, and check stamping occurs as a minority ware. Further north, in the Charleston area, the Pee Dee or Irene ware is replaced by pottery with bolder designs, thought to be representative of the protohistoric and historic periods (South 1971).

Although there has been very little archaeological exploration of historic period Native American groups in the Charleston area, South has compiled a detailed overview of the ethnohistoric sources (South 1972).

Early Settlement and Economic Development

The English established the first permanent settlement in what is today South Carolina in 1670 on the west bank of the Ashley River. Like other European powers, the English were lured to the New World for reasons other than the acquisition of land and promotion of agriculture. The Lord Proprietors, who owned the colony until 1719-1720, intended to discover a staple crop that would provide great wealth through its distribution in the mercantile system.

By 1680 the settlers of Albemarle Point had moved their village across the bay to the tip of the peninsula formed by the Ashley and Cooper rivers. This new settlement at Oyster Point would become modern-day Charleston. The move provided not only a more healthful climate and an area of better defense, but:

[t]he cituation of this Town is so

> convenient for public Commerce that it rather seems to be the design of some skillful Artist than the accidental position of nature (Mathews 1954:153).

Early settlers came from the English West Indies, other mainland colonies, England, and the European continent. It has been argued that those from the English West Indies were the most critical to the future of the colony, as they brought with them a strong agrarian concept, involving both staple crops and, especially, slave labor (Sirmans 1966).

Early agriculture experiments which involved olives, grapes, silkworms, and oranges were less than successful. Ironically, often the climate precluded successful results. While the Indian trade was profitable to many of the Carolina colonists, it did not provide the proprietors with the wealth they were expecting from the new colony. Ranching offered quick, and relatively easy, cash, but again the proprietors resisted such efforts, realizing that the profits they would reap were far smaller than possible from the mercantile system. Consequently, the cultivation of cotton, rice, tobacco, and flax were stressed as these were staple crops whose marketing the proprietors could easily monopolize.

Although introduced at least by the 1690s, rice did not become a significant staple crop until the early eighteenth century. At that time it not only provided the proprietors with an economic base the mercantile system required, but it was also to form the basis of South Carolina's plantation system (Carpenter 1973; for a detailed analysis of eighteenth century rice production see Trinkley et al. 2003:13-42). Over production soon followed, with a severe decline in prices during the 1740s. This economic down swing encouraged at least some planters to diversify and indigo was introduced (Huneycutt 1949:33). Indigo complemented rice production since they were grown in mutually exclusive areas. Both, however, were labor intensive and encouraged the large-scale introduction of slaves.

Although four counties, Berkeley, Craven, Colleton, and Granville, were created by the Proprietors between 1682 and 1685, the Anglican parishes, established in 1706, became the local unit of political administration.

South Carolina's economic development during the pre-Revolutionary War period involved a complex web of interactions between slaves, planters, and merchants. By 1710 slaves outnumbered free people in South Carolina. According to Fick (1992:14), by the year 1720 the St. Andrews Parish had 210 taxpayers and 2,493 slaves, a ratio of 1:12. By the 1730s, slaves were beginning to be concentrated on a few, large slave-holding plantations. At the close of the eighteenth century, some South Carolina plantations had a ratio of slaves to whites that was 27:1 (Morgan 1977). While over half of eastern South Carolina's white population held slaves, few held very large numbers. The Charleston area had a slave population greater than 50% of the total population by 1790. This imbalance between the races, particularly on remote plantations, may have led to greater "freedom" and mobility (Friedlander in Wheaton et al. 1983:34). By the antebellum period this trend was less extreme.

The area was the scene of relatively little economic development during the late colonial period. Zierden and Calhoun note that:

> Charleston was the economic, institutional and social center of the surrounding region. The necessity of transacting business in Charleston drew planters eager to transform their crops into cash or goods . . . it [was] virtually imperative for a planter interested in society to reside in Charleston at least occasionally (Zierden and Calhoun 1984:36).

They argue that Charleston provided an opportunity for conspicuous consumption, a

mechanism that allowed the display of wealth accumulated from the plantation system (with this mechanism continuing through the antebellum period). Scardaville (in Brockington et al. 1985:45) notes that the plantation system, which brought prosperity through the export of staple crops, also "made the colony . . . highly vulnerable to outside market and political forces."

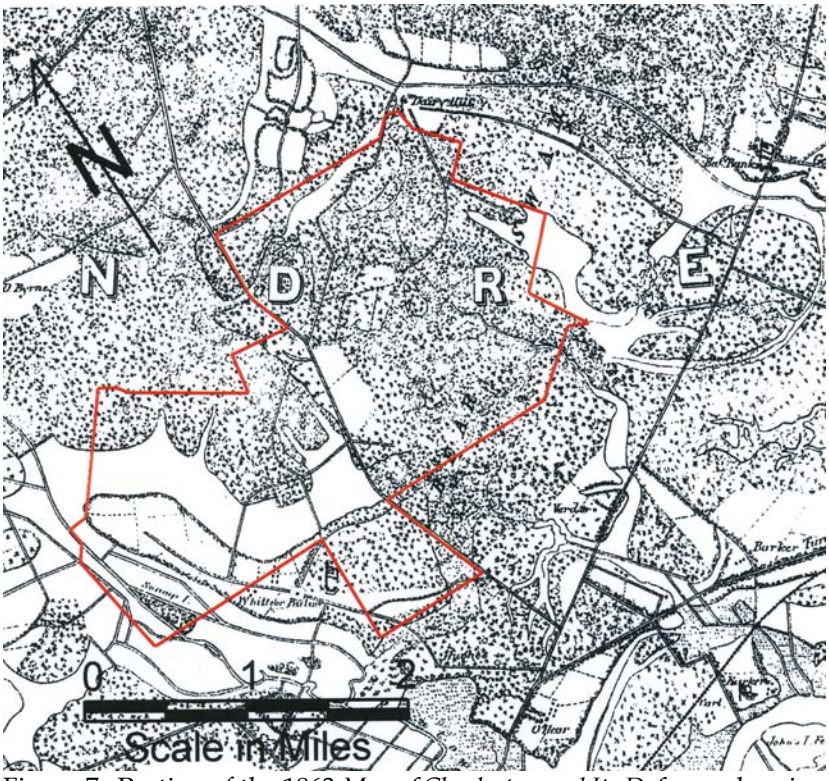


Figure 7. Portion of the 1863 *Map of Charleston and Its Defences* showing the project area.

The most obvious example of this is the economic hardship brought on by the American Revolution. Not only was the Charleston area the scene of many military actions, but Charleston itself was occupied by the British for over 22 years between 1780 and 1782. The loss of royal bounties on rice, indigo, and naval stores caused considerable economic chaos with the eventual "restructuring of the state's agricultural and commercial base" (Brockington et al. 1985:34).

Antebellum Charleston, Cotton Production, and the Civil War

One means of "restructuring" was the emergence of cotton as the principal cash crop. Although "upland" cotton was available as early as 1733, its ascendancy was ensured by the industrial revolution, the invention of the cotton gin in 1794, and the availability of slave labor. While "Sea Island" cotton was already being efficiently cleaned, the spread of cotton was primarily in the South Carolina interior. Consequently, Charleston benefited primarily through its role as a commercial center.

Cotton provided about 20 years of economic success for South Carolina. During this period, South Carolina monopolized cotton production with a number of planters growing wealthy (Mason 1976). The price of cotton fell in 1819 and remained low through the 1820s, primarily because of competition from planters in Alabama and Mississippi. Friedlander, in Wheaton et al. (1983:28-29), notes that cotton production in the inland coastal parishes fell by 25% in the years from 1821 to 1839, although national production increased by 123%. Production improved dramatically in the 1840s in spite of depressed prices and in the 1850s, the price of cotton rose.

The Charleston area did not participate directly in the agricultural activity of the state. Scardaville (in Brockington et al. 1985:35) notes that "the Charleston area, as a result of a large urban market and a far-reaching trade and commercial network, had carved out its own niche in the state's economic system." Zierden and

Calhoun remark that:

> [c]ountry merchants, planters, and strangers "on a visit of pleasure" flocked to Charleston. Planters continued to establish residences in Charleston throughout the antebellum era and "great" planters began to spend increasing amount of time in Charleston (Zierden and Calhoun 1984:44).

In spite of this appearance of grandeur, Charleston's dependence on cotton and ties to an international market created an economy vulnerable to fluctuation over which the merchants and planters had no control.

The development of the railroad, which encouraged trade to the upcountry, brought a revived Charleston economy. By 1857, St. Andrews received a rail line that ran to Savannah, further impacting the commercial economy (see Fick 1992:27).

The 1863 *Map of Charleston and Its Defences* (Figure 7) shows the survey area. The Bulow Battery is located just outside of the property boundary to the southwest. The Bulow Plantation house and slave settlement also appear to be just outside of the property boundary. No other structures or settlements are located on the project tract.

The increase in commercial activity, however, was short lived. The Civil War not only destroyed the architecture of the city, but it destroyed the economic order that was once so important in Charleston.

An appropriate summary is provided by Zierden and Calhoun:

> [t]he economic decline of Charleston occurred as the city was growing increasingly defensive of its "peculiar institution." The city sullenly withdrew into itself, eschewing the present and glorifying its past. The great fire of 1861 devastated much of downtown Charleston. The War Between the States . . . set the seal on a social and economic era (Zierden and Calhoun 1984:54).

There are several secondary sources that provide overviews of the vicinity during the Civil War. Rosen (1994), for example, helps place Charleston in a broader context, while Brennan (1996) focuses on nearby James Island and, in particular, Seccessionville.

Postbellum Period

After the Civil War Charleston and the surrounding countryside lay in waste. Plantation houses were destroyed, the city was in near ruins, the agricultural base of slavery was destroyed, and the economic system was in chaos. Rebuilding after the war involved two primary tasks: forging a new relationship between white landowners and black freedmen, and creating a new economic order through credit merchants. General sources discussing the changes in South Carolina include Williamson (1975), Goldenwieser and Truesdell (1924), and more recently, Zuczek (1996). Scardaville (Brockington et al. 1985:43-48), however, provides information on the changing labor patterns specifically in the Charleston area.

The nearby Christ Church Agricultural Society, organized in 1882. The Society's membership, like that of other organizations of the period, consisted of the remnants of the Southern planting aristocracy. The organizations, founded to encourage and promote the return of the "agrarian south," were concerned with a vast range of issues, including planting practices, the prices offered for various crops, the transportation of crops at reasonable prices on the new railroads, and resolving what were considered constant labor problems, i.e., the control of “Negroes.”

For example, as late as 1909 the members of the Christ Church Agricultural Society agreed to a list of labor rules closely resembling antebellum slavery, including:

▪ no laborer shall be taken who is in debt, without payment of such debt.

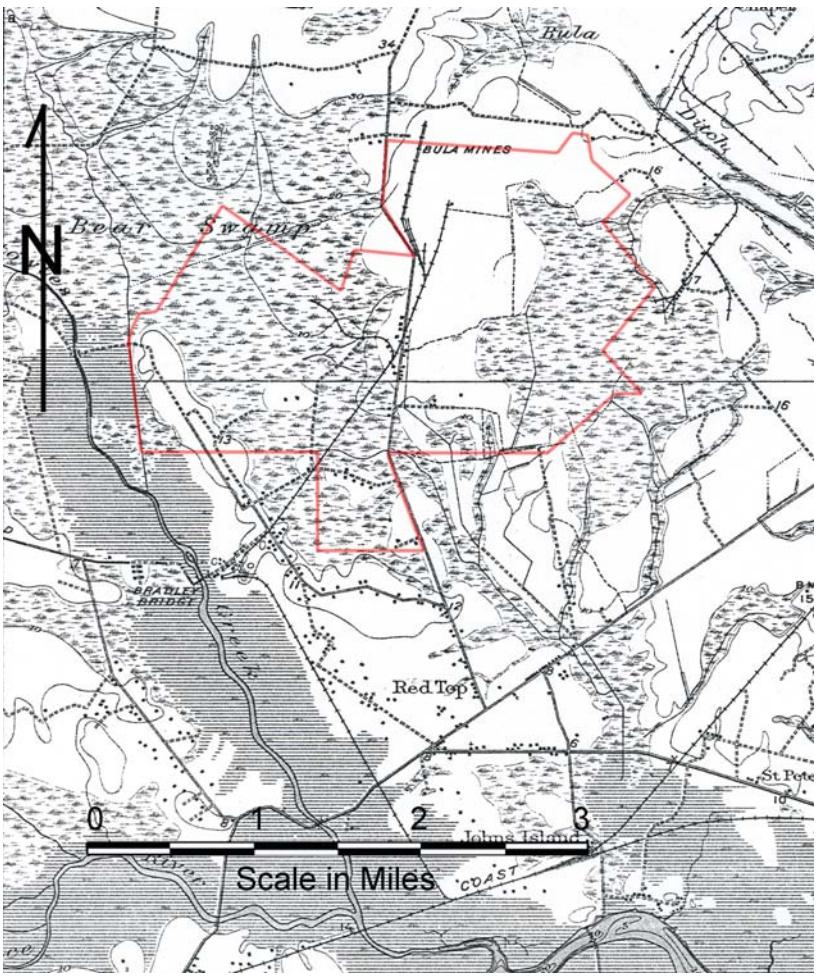


Figure 8. Portion of the 1918 Ravenel quadrangle showing the project area.

▪ no laborer who has been discharged for insubordination shall be taken during the current year or within six months.

▪ that all tenants shall agree to give there [sic] spare time to their landlords when called on (South Carolina Historical Society, Christ Church Agricultural Society Minute Book, 34-197).

The society's constant interest in agricultural prices and conditions is shown by a 1902 report:

> unusually fine corn crops planted in the parish, and also find the acreage a large one, which gives promise of a large yield. Peas and potatoes have not been neglected and, on the whole, the crops generally are up to the standard. The committee found the asparagus crops in good condition and some of the crops of young asparagus above the average. No complaints were made of rust . . . . Labor is abundant, but getting more and more inefficient each year . . . . Until we cease employing labor that has been discharged for cause, inefficiency, etc. . . . so long will we make the labor more and more worthless. We pay from 40 to 50 cents per day for our labor and I doubt if, under the best management, we receive 20 to 25 cents value for it . . . . The prices obtained for truck, during the past year have not been remunerative, more stuff being shipped and less money realized; in some instances the falling off amounting to 30 percent (South

Carolina Historical Society, Christ Church Agricultural Society Minute Book, 34-197).

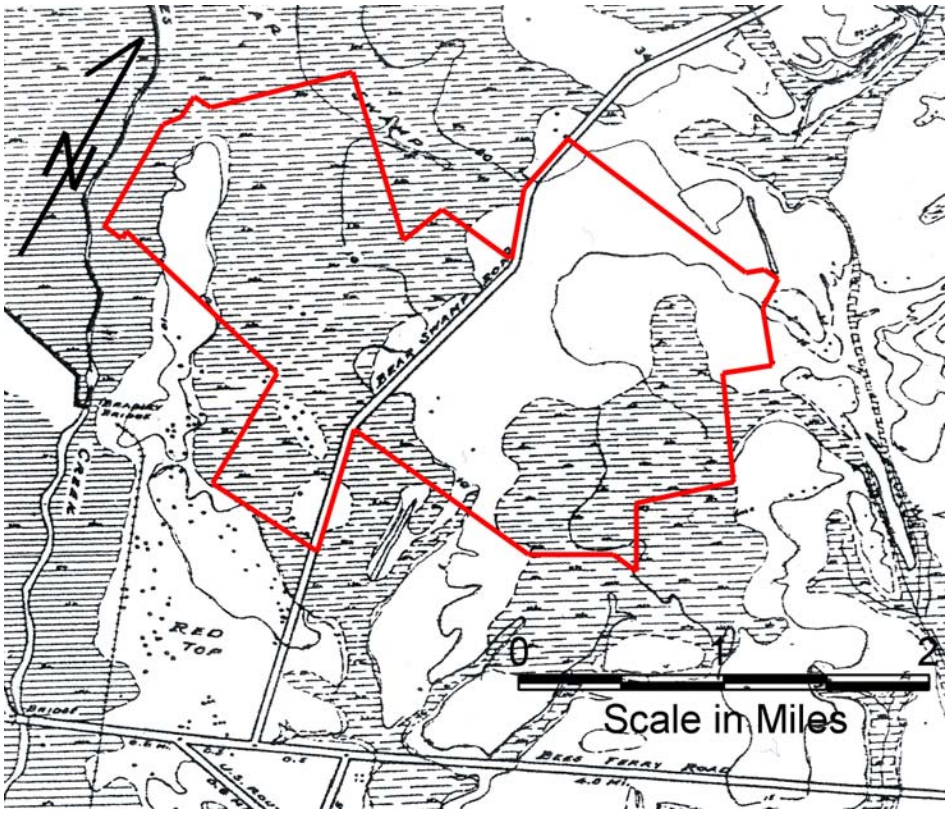


Figure 9. Portion of the 1929 *Sanitary and Drainage Commission Map* showing the project area.

As Scardaville notes (Brockington et al. 1985:52), it is very difficult to use the agricultural schedules for economic analyses after 1870. The 1880 schedule seriously under-represents Charleston District, the 1890 schedules were destroyed by fire, all subsequent schedules are provided only on a county level (the individual parish and farm level information being destroyed under authority of Congress), and vital information is missing from the 1900 census. At a county-wide level, however, it is clear that between 1870 and 1910 Charleston's agricultural production gradually increased, the labor system stabilized, and prosperity returned.

In terms of relative importance, cotton and livestock were the two most important agricultural activities in Charleston County, followed by truck farming and grain production. During the late postbellum tenancy increased dramatically throughout South Carolina, except for several coastal areas where Scardaville suggests black farmers were able to purchase small tracts. Where tenancy did exist, it was largely cash rental, not sharecropping, and Scardaville argues that this formed the vital link allowing black ownership (Scardaville in Brockington et al. 1985:62).

Beginning shortly after the Civil War, truck farming became one of the primary agricultural activities of area farmers. The combination of soil fertility, climate, and proximity gave truck farming an edge in the effort to supply Charleston with produce. As early as 1873 it was noted:

> the cultivation of garden produce for export in the neighborhood of Charleston, was not pursued as an occupation previously to the years 1865 or 1866. [Recently,] there are a large class of farmers & planters in St. Andrew's and Christ Church Parishes . . . who, in connection with a crop of Sea Island cotton, grow vegetables for export (Charleston Chamber

of Commerce 1873:32-33).

As a result, many blacks were employed as wage laborers. Produce increased from about one-quarter of the county's agricultural production in 1890 to over three-quarters by 1930 (Scardaville in Brockington et al. 1985:74). Much of this prosperity, however, disappeared during the Great Depression, when trucking in Charleston County declined by 75%.

There was another source of income for many African Americans – the phosphate mines. The social and economic importance of phosphates is discussed in a following section of this report.

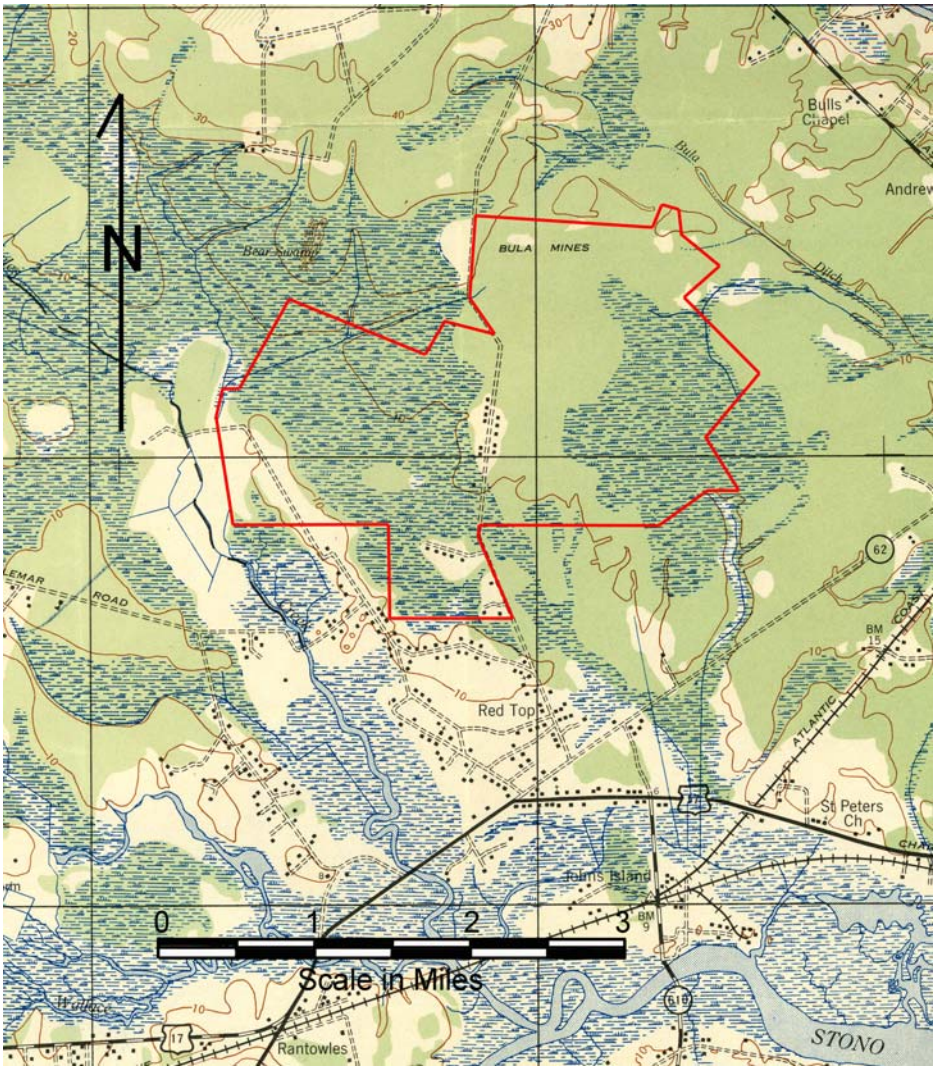


Figure 10. Portion of the 1944 Ravenel quadrangle showing the project area.

The 1918 Ravenel quadrangle shows the project area toward the end of the phosphate mining period (Figure 8). Tram roads are apparent along with at least 30 structures. The largest nearby community is that of Red Top, shown as a diffuse scatter of structures on at least four roads. Included are at least four churches and a school. The July 1889 R.G. Dun & Co. Mercantile Agency Reference Book lists two Red Top businesses – both general stores. One is J.G Lindstedt, the other is R.D. Sterling. Both have less than $5,000 capital and their credit is rated as "fair." Other nearby communities include Johns Island, a stop on the railroad line between Charleston and Savannah that boasted 14 general stores and Rantowles with two general stores (Dun 1889). .

To the west of the tract is Bradley Bridge, shown linking the east and west sides of the Rantowles at the approximate location of the earlier ferry. On the east side was the processing plant for the Bulow Mines, shown as four industrial buildings and, to the north, three structures that may represent workers' housing.

As agriculture production declined during the depression, beef and dairy farming gained

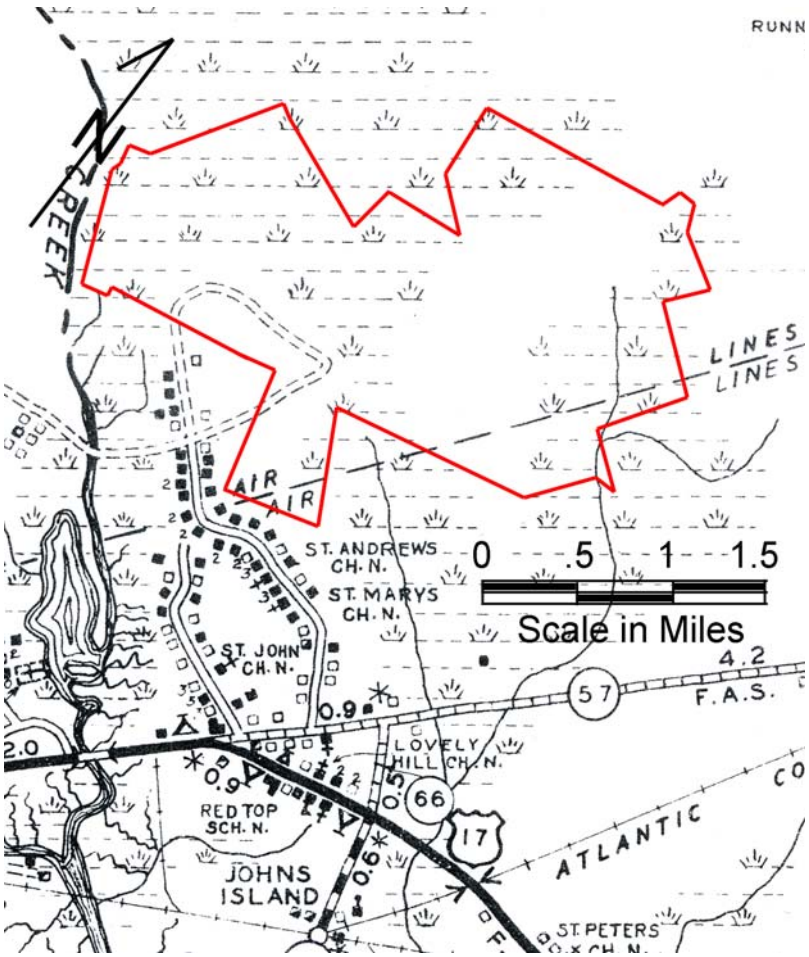


Figure 11. 1948 Charleston County General Highway and Transportation Map showing the project area.

ground (Fick 1992:51). In St. Andrews Parish, Coburg Dairy was founded in 1920 and by 1969 it was the "largest independent dairy in the state" (Fick 1992:51).

The 1929 *Sanitary and Drainage Commission Map* (Figure 9) shows only the main Bear Swamp Road and no tram roads are recorded or evident. In addition, the number of structures illustrated has decreased to only 13, with most of these located on the southern portion of the tract.

Red Top is still shown as an amorphous, but growing cluster of structures. By 1912, however, R.G. Dun (1912) no longer lists any business in Red Top. Instead, Lindstedt is listed under Johns Island with the notation "near," as are A. Banov, who sold clothing, shoes and other items, and Frank W. Rivers.

Johns Island is still a thriving community with one gin, operated by Harrod & Limehouse and seven general stones. Also listed in Johns Island were the Bolton Mines Co. and P.B. and R.S. Bradley – both as phosphate companies.

The situation had not changed much by the time of the 1944 Ravenel quadrangle (Figure 10). Although tram roads are not shown, the number of structures on the study tract has increased to 19 in two distinct communities, perhaps signifying multiple building episodes within the property. Nearby Red Top is still a diffuse community with three churches. Johns Island continued to be a major rail station. And although Bradley Bridge appears to still be standing, the industrial complex on Rantowles Creek is no longer shown (although a number of structures appear to be associated with the Bradley estate).

The 1948 Charleston County General Highway and Transportation Map is not very different from the earlier topographic map. It does, however, provides names for four of the five African American churches in the area, including Lovely Hill, St. Mary's, St. John's, and St. Andrew's. Although Red Top is not identified by name, the map does show the location of the African American Red Top School. No structures are shown on the study tract, although this is almost certainly the result of the roads not being state maintained.

SOUTH CAROLINA LAND PHOSPHATES IN THE LATE NINETEENTH AND EARLY TWENTIETH CENTURIES: TOWARD AN ARCHAEOLOGICAL CONTEXT

Michael Trinkley

What is Phosphate?

Phosphorus (P) is one of 17 nutrients required by all living plants and animals; deficiencies of this element in soils are a major cause of limited crop production. When P fertilizers are added to soils deficient in the available form of this element, increased crop yields generally follow.

Phosphorus, however, is highly reactive and is not found in its elemental form naturally. Instead it occurs as phosphate – a charged group of atoms, or an ion. Made up of a phosphorus atom and four oxygen atoms (PO_4) it has a negative charge and readily combines with other atoms and molecules within living organisms to form a variety of compounds essential to life. In inorganic chemistry, a phosphate is a salt of phosphoric acid. As a consequence, we do not mine phosphorus – we mine phosphate rock.

In 1840 Justus von Liebig, a German scientist, made the first clear, intelligent exposition of the role of minerals in plant growth and laid the ground work for modern agricultural science. He demonstrated that insoluble phosphates, readily available as bone, could be made to release their phosphorus in a form more quickly accessible to growing plants if they were first treated with sulfuric acid. Building on this, John Bennett Lawes, an Englishman, treated the readily available English fossil coprolites with sulfuric acid. By 1842 he had obtained a patent on his process and the first "superphosphate" was commercially available.

Normal superphosphate is a fertilizer containing 15 to 21% phosphorus as phosphorus pentoxide (P_2O_5). It is created by reacting ground phosphate rock with 65 to 75% sulfuric acid (virgin acid is preferred) (Mann 1992). The quality of phosphate rock is generally identified by its content of tricalcium phosphate ($Ca_3P_2O_8$), called bone phosphate of lime (BPL). Chemical analyses are usually reported as the P_2O_5 percent (phosphoric acid) or percent of BPL (1% BPL = 0.485% P_2O_5).

Within 20 years of Lawes' patent, the British were producing 150,000 tons of superphosphate a year. The coprolites, however, had a relatively low yield. With the discovery of rich deposits of rock phosphate in South Carolina after the Civil War, the American industry took the lead in both mining and fertilizer production.

South Carolina's Phosphate Beds

Synthesizing in the way that only newspapers can do, a June 4, 1868 *New York Times* article entitled, "The South Carolina Deposits of Bone Phosphate," described the phosphates:

> they frequently crop out of the surface, and are commonly found in strata from one to two or more feet in thickness, dipping from the surface to eight or more feet below it – generally the deposit is from one to two feet.

A later article, again in the *New York Times* ("South Carolina – The Phosphate Region, April 8, 1871), quoted local scientist Francis S. Holmes as observing that the rock strata were typically 15 to 18 inches in depth, with the average yield being about 600 tons per acre, although "there are many 'diggings' now returning eight hundred and a thousand tons per acre."

A decade later the *New York Times* gave a very similar account:

> while the prevailing level is not more than 10 feet above high-water mark. . . . I did not see any land mines of more than 6 feet in depth. . . . The land mines exhibit very slight differences in level, though beds are found underlying hundreds of contiguous acres. The yield of clean, dry rock varies from 300 to 1,200 tons an acre, the average yield of the land beds now worked being from 700 to 800 tons an acre. . . . nodules of egg-like, or kidney, form. The exterior of these nodules is rough and even honeycombed by irregular cavities as a generality; though they are also found of smooth and compact shapes. The nodules vary greatly in size; some are less than an inch, some are several feet, in diameter. . . . When the phosphate nodules are freshly dug they emit, under friction, a very unpleasant fetid odor, which is doubtless due to the organic matter which they contain; and before the discovery of their great value the negroes called them "stinking stones." ("Digging Phosphate Rock – Scenes at the Great South Carolina Mines, *New York Times*, October 18, 1881).

Otto A. Moses reported that the phosphate beds close enough to the surface to be profitably mined using hand labor were "about equally distributed in the counties of Beaufort, Colleton, and Charleston" (Moses was writing just before Berkeley County was carved out of Charleston County; much of his study area came to lie in Berkeley) and were called, respectively, the Coosaw, Edisto, and Ashley Deposits (Moses 1882:504). By the early twentieth century Chazal was a little more precise:

> Beginning from their Northern limit, however, the principal beds may be divided into general groups, which may be designated as follows
> Wando River beds.
> Cooper River beds.
> Northeastern Railroad and Mount Holly beds.
> Ashley River beds.
> Stono River beds.
> Edisto and Ashepoo beds.
> Coosaw River beds.
> Beaufort River beds (Chazal 1904:2; see also Rogers 1915:200-202).

He notes the Ashley River Beds had thus far provided the "greater part of the output of land rock" (Chazal 1904:3; Rogers 1915:201), although a "large and very valuable body of rock land of good quality and moderate depth" was found to the west of the Ashley, towards the Stono River, Rantowles Creek, and Bear Swamp. Chazal remarks that while this area had seen "almost continuous mining from the commencement of the industry" the beds are so large "that there has not been the same proportion of removal as on the opposite bank of the river" (Chazal 1904:4). The importance of the Rantowles Creek deposits was early reported by Rowland (1883:1008), who also noted that these deposits occurred "at a remarkably uniform depth."

Moses explained that the beds were all very physically different – it was only the peculiar odor, the chemical analyses, and the similar fossils that "unite them into one and the same group" (Moses 1882:508). He goes on to observe that the average rock contained 53-60% phosphate of lime, 5-10% carbonate of lime, and 1-10% moisture. Moreover, the rocks all contain much organic matter that is "highly nitrogenous, and is analogous to the oils of bituminous shales" which upon heating (during the drying process) "greatly assists combustion," more quickly drying the rock

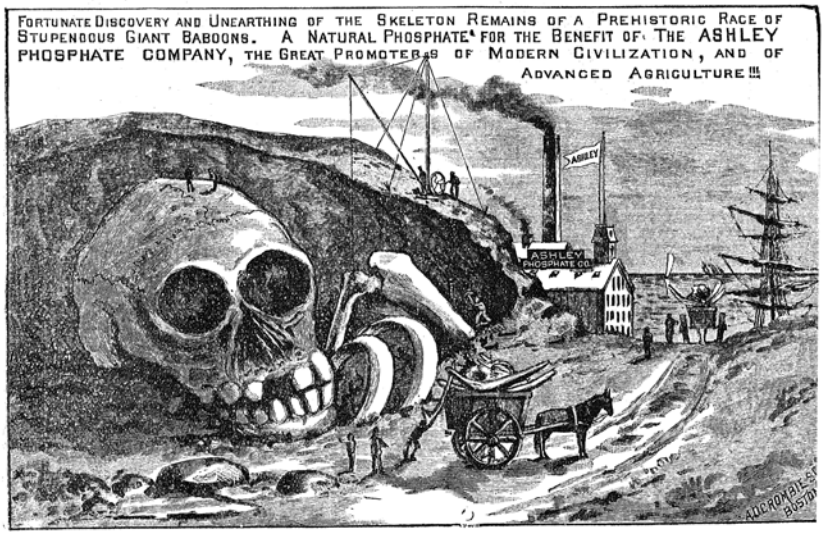


Figure 12. Ad for Ashley Phosphate based on the concept of the phosphate resulting from fossil deposits (from Holmes 1870).

(Moses 1882:510).

The phosphate rock lay in what Waggaman reports had been called the "'Fish Bed' of the Charleston Basin on account of the numerous teeth and bones of marine animals contained therein." This belt was about 20 miles in width, extending from the Wando River in Charleston County to the Broad River in Beaufort County (Waggaman 1913:2). The phosphates occur:

> embedded in a matrix of sand, clay, and calcareous mud. The beds vary from a few inches to 3 feet in thickness, with an average thickness of approximately 1 foot. The nodules average from 30 to 50 percent of the phosphate stratum, and the beds will yield from 300 to 1,500 tons of phosphate per acre, with an average of about 850 tons. The beds, as a rule, do not follow the contour of the land surface, but lie nearly horizontal. The overburden, therefore, varies considerably from place to place. . . . The South Carolina phosphates occur in nodules varying from the size of sand grains to bowlders [sic] weighing several tons. The rock varies in hardness and texture from soft porous materials to hard, lustrous, flinklike pieces. The nodules are sometimes smooth rounded or kidney shaped, closely resembling "coprolites," but more often they are irregular in shape, pitted or completely perforated, the holes usually being filled with sand and clay, which had to be removed by washing. In color the rock varies from grayish white to almost jet black, and between these two extremes there are a variety of shades of red, yellow, and brown (Waggaman 1913:4-5).

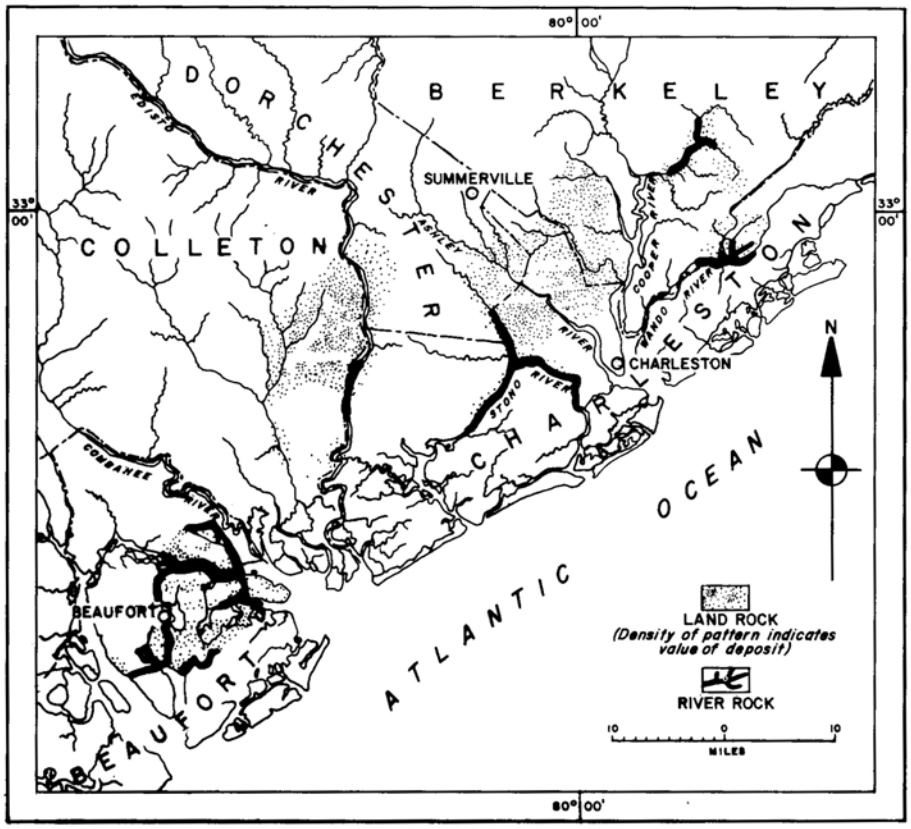


Figure 13. Distribution of phosphates in South Carolina (from Rogers 1915).

While the various descriptions of the phosphate deposits are generally similar, there remains controversy concerning the origin of these deposits. As late as the second half of the twentieth century Malde (1959:70) provided no theory of origin, focusing instead on the rocks' properties. Mappus notes that a variety of theories have been offered to explain the origin of the rock, although most were based on significant misconceptions of the geological relations of the deposits (see, for example, Holmes 1870). She notes that the most commonly accepted theory was the "residual soil theory" of Rogers (Mappus 1938:1-3; see Rogers 1915:205-209).

Rogers believed that Cooper marl formed on land surfaces during the Oligocene and early Miocene, during which time it suffered erosion with the coarser materials accumulating as re-sidual soils. By the end of the early Miocene the Cooper land surface was covered with an irregularly distributed, but highly phosphatic residual soil. At the end of the Miocene the region was depressed and fossils were added. As the ground level re-elevated a thick deposit of phosphate materials was exposed to dissolution. The phosphate then precipitated where the water stood in contact with lime carbonate. This concentrated the phosphate at the bottom of the Edisto marl. Additional fossils were added on top of the phosphate beds, but were not incorporated in the mass (see also Murphy 1995:110).

More recently Albert Sanders (2002) reported an undisturbed phosphate bed in the heart of the phosphate mining region. He reports that the upper 2.7 feet deposit was the late Pleistocene Wando Formation, with lower 0.7 foot representing lag deposits of phosphate rock and reworked bone – suggesting that the majority of the phosphate deposits are from the lower Wando Formation. Below the phosphates were the Penholoway Formation and deeper the late Oligocene Ashley Formation. This suggests that the phosphate deposits are more recent than previously thought.

Origin of the Industry

Newspaperman and local historian Chalmers Murray discusses the close-minded attitude South Carolina planters held toward

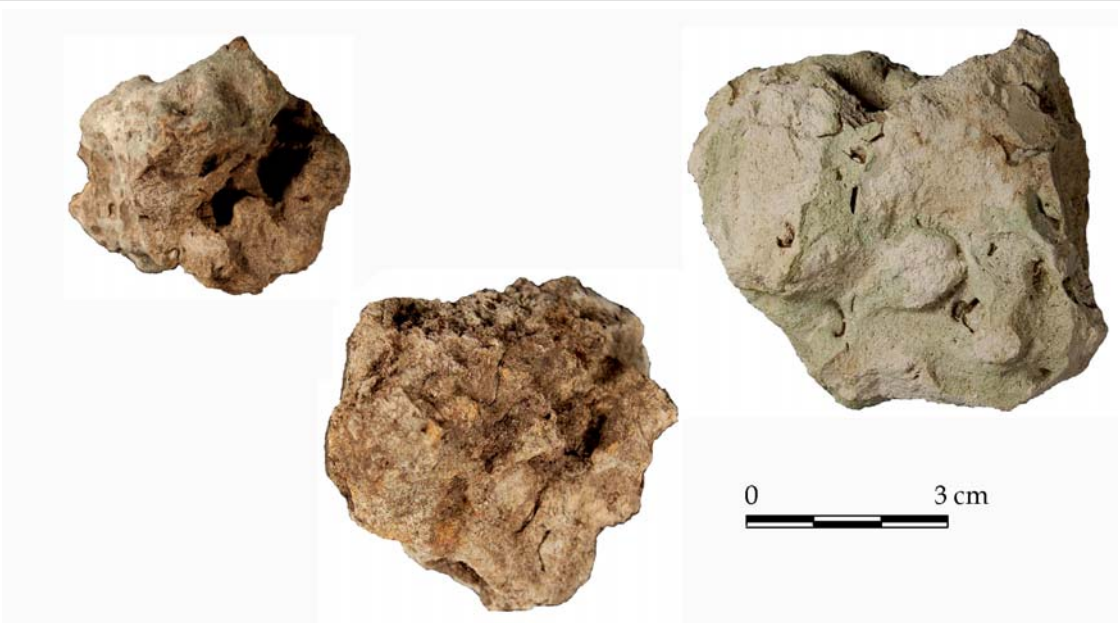


Figure 14. Examples of phosphate rock found at the Bulow Mine, showing the range in size and color from this one location.

new crops and new methods in the decade just before the Civil War. He cites an 1855 agricultural report of the U.S. Commissioners of Patents, that "according to the communications received by the patent office, the most popular fertilizers of the time were barnyard manure, guano, superphosphate, green sand and marl, and green clover plowed into the soil. None of the letters came from below the Mason and Dixon Line" (Murray 1949:120-121).

McKinley (2003) provides a rather detailed analysis of the discovery of rock phosphate, the gradual recognition of its potential, and the extraordinary need presented by the worn and often abandoned agricultural fields of the South. The American fertilizer industry was built on guano – the droppings of sea birds and bats that are high in both phosphorus and nitrogen. While never heavily used in the South, there are advertisements such as the one shown in Figure 15, appearing in 1867. Northern farmers became devoted users; with increased use, combined with political instability and nationalism abroad, the price of guano rose – making it increasing inaccessible to northern farmers (McKinley 2003:24). In its place American fertilizer factories began to focus on superphosphates, using bone as their source of raw material.

Southern farmers often "found the new commercial fertilizers too expensive, uneven in quality, and often inaccessible" (McKinley 2003:28). Nevertheless, fertilizers gradually gained acceptance, likely because superphosphates were less expensive than guano (McKinley 2003:35).

PERUVIAN GUANO.

DIRECT FROM AGENTS AT MARKET RATES.

SOLUBLE PACIFIC GAUNO, $75 Cash, $80 1st November, with interest, approved City acceptance.
SWAN ISLAND GUANO, $20 Cash, $25 1st November with interest, approved City acceptance.
BAUGH'S PHOSPHATE LIME, $60 Cash, $65 1st November, with interest, approved City acceptance.
PHŒNIX GUANO, $55 cash.
FLOUR OF BONE, unadulterated and unburnt.
FARMER'S PLASTER OR GYPSUM, warranted pure.
In offering the above Manures to Planters, I do so with every confidence, not only having testimonials from Planters who have used them the past year, but the further guarantee, that every cargo as it arrives from the Factory, is analyzed by Prof. SHEPARD of the South Carolina Medical College, and the high reputation of these manures fully kept up. J. N. ROBSON,
January 1 13mos 6 62 East Bay.

Figure 15. Advertisement for guano in the Charleston *Daily Courier*, January 1,

Figure 16. Mining guano off the Peruvian coast, ca. 1860.

McKinley (2003) and Waggaman (1913) – among others – point out that the gradual recognition of phosphate rock's importance dates prior to the Civil War. The process includes such gentlemen scientists as Edmund Ruffin and his agricultural survey of South Carolina – although he was blinded to the potential of phosphate by his single-minded focus on marl -- and Francis S. Holmes, although he, too, remained focused on marl and its fossils. It was Charles U. Shepard who first recognized the importance of phosphate rock – as well as the first to promote the mineral theory of Liebig in South Carolina (McKinley 2003:52, 58; Waggaman 1913:2).

The Civil War brought together and influenced some of the more significant phosphate scientists and fertilizer pioneers of the postbellum – Nathaniel A. Pratt, St. Julien Ravenel, David C. Ebaugh, Christopher G. Memminger, and George A. Trenholm. It was not, however, until after the Civil War that phosphates came into their own.

Hanahan (1927:84-85) remarked in 1927:

> Coming out of the Confederate war, the men of South Carolina had no industry to engage their attention but agriculture, and it was more than ever necessary that the lands be made to produce increased yields; then, too, the one crop that South Carolina could raise, cotton, was in great demand at high prices. In 1866, the attention of Shepard, Ravenel, Holmes and Pratt was centered on the utilization of the phosphate rocks, which were now known to exist in large quantities near Charleston, for the manufacture of commercial fertilizer.

Whitney (1985:1) explains that it was St. Julien Ravenel "who discovered the nature of the rock, and realized he was sitting on a gold mine." Nevertheless, McKinley notes that Ravenel did nothing with this information, at least initially, suggesting that he either doubted the claims or did not fully appreciate the possibilities until later (McKinley 2003:94). Waggaman (1913:2) spreads the credit evenly between Ravenel, Holmes, and Pratt, observing that it was Pratt who obtained the "first recorded analysis of high-grade South Carolina phosphate." Pratt also identified the core of the South Carolina phosphate region – the Ashley River region – and established the standard of 55% BPL for phosphate rock (McKinley 2003:95).

Ravenel, with David C. Ebaugh and Charleston factors C. Dukes & Company, began the Wando Fertilizer Company with $100,000 of Southern capital (McKinley, however, observes that it uncertain whether this represents actual or pledged capital; McKinley 2003:90-91). The firm set up impressive – and formidable – works

at Palmetto Wharf on the Cooper River, including an iron crusher and pulverizer (to crush and then pulverize the phosphate rock, increasing its reactivity), and a mixer (to mix the sulfuric acid with the crushed rock in order to create superphosphate). Having no source of local sulfuric acid, McKinley notes that they were importing the acid (McKinley 2003:91).

Pratt and Holmes formed a competing organization, with Holmes bringing to the table a huge acreage in the Ashley River basin. They were, however, far less successful in finding Southern investors (McKinley 2003:97-98). It remains unclear why one team was so immediately successful at raising capital, while the other was not. Certainly there was no perceivable difference in skill or expertise. Although McKinley does not tackle this issue directly, he does note that, "generally stingy in non-agricultural investments before the war, and paralyzed by war and emancipation, Charleston's planters and factors were even more conservative and cautious in what they perceived to be the socially revolutionary and financially ruinous atmosphere of Reconstruction" (McKinley 2003:98). This is certainly an adequate explanation, except that it still fails to explain one success against the other failure. Perhaps more to the point was the comment from a local businessman:

> Dr. Pratt, do you, only recently come among us from Georgia, expect us to believe you, when you say that this material is worth and will bring $20 to $25 per ton, while men like Lyell, Agazziz, Tuomey, Ruffin, Holmes, Shepard, Hume and other, have known and handled it for twenty-five years? Excuse us, we cannot believe it (quoted in McKinley 2003:98).

Reading between the lines, we see South Carolina's historic parochialism, coupled with xenophobia. Pratt, although from another Southern state and a well respected ex-Confederate, was not from South Carolina or Charleston's historically closed community.

It is then particularly ironic that after being snubbed by Charleston's business community and looking northward for capital, Pratt and Holmes were roundly criticized for enlisting "foreign capital" (McKinley 2003:103). Nevertheless, Pratt and Holmes found the needed capital in the partnership with George T. Lewis and Frederick Klett. The latter was an industry leader and president of Potts & Klett, a sulfuric acid and superphosphate manufacturer, while Lewis was a prominent chemical manufacturer (McKinley 2003:105). Together they organized the Charleston, South Carolina Mining and Manufacturing Company in September 1867.

Several decades after the fact, the Charleston *News and Courier* reported:

> The first cargo, one hundred tons, was shipped by the schooner *Renshaw*, on the 14th of April, 1868, to Baltimore, Md. By John R. Dukes, Esq., president of Wando Company, Charleston. The Charleston Mining and Manufacturing Company shipped to Philadelphia three hundred tons, per schooner *Anna Barton*, on the 18th, four days later (News and Courier 1884:54).

Although both companies shipped phosphate rock at approximately the same time, the Charleston Mining and Manufacturing Company quickly dominated the land rock field. Within a year the company owned over 10,000 acres on both sides of the Ashley River and controlled, through long-term leases, an additional 10,000 acres (Table 1).

McKinley discusses the range in prices for phosphate lands ($2.94 to $40.00 per acre – or

Table 1.
Plantations Purchased by Charleston Mining and Manufacturing
(adapted from McKinley 2003:Table 2.2)

Plantation (Owner)	Acres	Cost ($)	$/Acre	$/Acre (2002$)
Ashley Hall (Holmes)	250	10,000	40.00	482.00
Hickory Hill (Banks)	277	3,500	12.64	152.00
The Oaks (Ramsey)	750	5,000	6.66	80.00
Clear Springs (Cothers)	1,000	6,000	6.00	72.00
Marysville (Lamb)	1,000	10,000	10.00	120.00
Blacksmith (Goodrich)	3,872	45,000	11.62	140.00
Simmons Hill & Hacket Hall (Yates)	1,700	5,000	2.94	35.00
Feteressa (McPherson)	695	5,280	7.60	92.00
Pringle Farm (Pringle)	250	4,500	18.00	217.00
Turnbull (Commins)	806	7,400	9.18	111.00
O'Neill Farm (O'Neill)	149	1,500	10.07	120.00
	10,749	103,180	12.25	147.36

$35 to $482 in 2002$), noting that a variety of factors likely came to play. For example, although Joseph A. Yates received the lowest amount, he was also made superintendent of Charleston Mining and Manufacturing (McKinley 2003:111). Perhaps more interesting is the motivation behind the decision to sell family lands, regardless of the price. McKinley observes that the Radical Republican government in South Carolina created an aggressive tax policy in order to raise the funds necessary to enlarge state services. Large landowners were confronted with significant tax bills and limited agricultural potential. Moreover, lands that were – prior to phosphates – selling for $2 an acre did advance dramatically in price.

A sample phosphate lease provides some insight on the activities that took place during this early period of exploration and land accumulation. The April 24, 1868 agreement between Ottolenquin A. Moses (later Otto A. Moses who worked for the U.S. Geological Survey) of Charleston and William L. Bradley of Boston describes the lease of what is likely the Eight Mile Pump tract.

> On 4/24/1868, Horace Massot conveyed to Moses the right and privilege of by himself or his agents entering upon all or any part of the 113-acre tract in the Parish of St. James, Goose Creek [today's Berkeley County] that was conveyed to Massot by G. W. and R. G. Reynolds . . . for the purpose of searching for minerals and fossil substances, conducting mining operations to any extent deemed feasible, and for working, removing, selling, and as the property of Moses, to use and appropriate for 10 years from 4/24/1868 all organic or inorganic minerals, rocks, fossils, marl, or so-called phosphates that may be by any person or persons found on the tract, with the right at all times in order to facilitate said Moses in [these activities], to cut and remove any trees, wood, and timber – reserving the property in the trees, wood, and timer removed to Massot to dispose to his advantage. Moses shall not at any one time engage in working more than 1/3 part of the tract. Moses may select the part to be worked, and make such selection as often as he desires. Also a right-of-way to construct a railroad or other road for removing, transporting, and delivering from the quarries such minerals, rocks, marls, fossils, and so-called phosphates, and constructing and erecting any machinery used in the extraction, preparation, manufacture and

> transportation, with the right to remove the machinery at the end of the term. By this agreement, Moses assigns to Bradley his rights on the land at the west side of land owned by Northeastern Railroad Company, which runs through the plantation, for the unexpired term of the agreement between Moses and Massot. Moses covenants that the premises will yield 45,000 tons of phosphate strata, providing the same be dug out and removed from the land and weighed in a faithful and workmanlike manner. Bradley may dig where and as he please, provided it is not more than 1/3 of the tract at any one time. Bradley to pay Moses $45,000 in nine equal annual payments, the first 4/1870. Bradley will thoroughly dig over and in a faithful and workmanlike manner collect the phosphate strata in the portion of the land, to wit all 113 acres west of the railroad. He will pay Moses $1/ton (2240 lb. tons). The quantity and weight to be measured at the port where it is delivered by Bradley, a copy of the bill of lading to be provided to Moses. Moses retains the right to dig and remove for his own use, 2000 tons (2240 lb. tons) at no charge(Charleston County RMC, DB B16, p. 217).

The preceding agreement, between Moses and Massot granted Moses the right to dig and explore the same as in the agreement between Moses and Bradley, with Moses paying Massot $2,000 ($25,300 in 2002$) (Charleston County RMC, DB F15, pg. 515). At each step there was a notable increase in the profit margin – from Massot to Moses, $2,000; from Moses to Bradley $45,000 ($529,600 in 2002$); then, should Bradley succeed in mining the anticipated 113 acres with 45,000 tons of rock, he could count on a profit of perhaps $112,500 ($1,124,000 in 2002$).

Although the Charleston Mining and Manufacturing Co. dominated the land rock industry, this does not imply that Wando faltered – as implied by Chazal (1904:49). McKinley observes that the company's business plan focused not on land mining, but on fertilizer production. Wando initially depended on foreign rock for its fertilizer production, although by December 1867 began acquiring local interests and marketing itself making fertilizer affordable for local farmers (McKinley 2003:133-134).

A Brief Review of Land Rock Companies

There is yet to be produced a thorough history of the land rock companies – surprising given their significance (albeit brief) to the local economy. This review lists some of the more common companies prior to the twentieth century.

"An Augusta, Georgia Co."

This ambiguous reference (Anonymous 1870:77) adds only that the company was mining "on the line of the Northeastern Railway, about 10 miles" from Charleston.

Ashley Phosphate Mining Co.

Operating on the Middleton lands, the president was Charles C. Baker of Baltimore, with Williams Middleton as the local agent and superintendent. By 1870 "a very effective washing apparatus built by J.M. Eason & Brother" had been erected at the mines (Anonymous 1870:77). This company advertised its use of the Duc Atomizer Mill, invented by H.A. Duc, Jr. of Charleston, to create floats – very finely ground phosphate. The company explained to its consumers:

> floats will not be found in any manner or degree a substitute for Acid Phosphate . . .; and we can only recommend its use as an adjunct; . . . where one can afford to wait for tardy and remote results . . . (Anonymous 1882a:27).

McKinley (2003:223-242) provides an excellent account of these operations.

Atlantic Phosphate Co.

This company, begun in December 1870, had apparently purchased the Livingston Farm on the Ashley River and was in the process of connecting its mines "on a fine bluff" with the South Carolina Railway. The capital was $200,000 and F.J. Porcher was president (Anonymous 1870:78; Chazal 1904:85; Holmes 1870:85). The company is also cited by the Stono Board as selling their product so inexpensively as to eventually cause the Stono Phosphate Co. to dissolve (Stono Phosphate Co. Minutes, 1881-1888, South Caroliniana Library). In 1889 the Atlantic Phosphate Co., with capital of at $200,000, received a "high" credit rating (R.G. Dun & Co. 1889).

Berkeley County Phosphate Co.

This company has been identified only in the 1889 credit report of R.G. Dun & Co. (1889), where it was reported to have a high credit rating, although its capital was under $35,000. It is unclear whether this firm was engaged in mining or perhaps only fertilizer production.

Bolton Phosphate Mines

The Bolton Mines were established on a Stono River tract of nearly 3,000 acres. David K. Jackman and Milton Courtright paid $36,000 for the tract in 1867 (Charleston County RMC, DB A15, p. 150). Jackson subsequently conveyed his interest to Courtright, an industrialist and railroad engineer of Erie, Pennsylvania.

Apparently a controlling interest, at least for a time, was the London firm of Wylie & Gordon (Anonymous 1884). About this same time St. Amand reported J. C. Houston managed the Bolton Mines (Clarence W. St. Amand Journal, pp. 49, 61, South Carolina Historical Society). Wyatt (1891:55), however, notes these mines were being operated by K.S. Tupper but were poorly capitalized at only $50,000. The 1884 *News and Courier* article, "There's Millions in It," notes that the Bolton plant had a value of $25,000, employed 200 hands – both Italians and African Americans – and mined 15,000 tons of rock annually. The Edward Willis Scrapbook (South Caroliniana Library) notes that the Bolton mine was also operated by Carolina Fertilizer Company. In 1889 the Bolton Mines, with capital of under $300,000, was given a "high" credit rating (R.G. Dun & Co. 1889). By the early twentieth century Chazal (1904:65) noted that the mine, "while operated by its owners or lessees, sells its whole output to the Virginia-Carolina Chemical Company."

A long-term lease of the land to Bolton Mines Company, signed in 1909, remained in effect when Courtright's son-in-law and grandson conveyed their partial interest to Peter B. and Robert S. Bradley in 1911 (Charleston County RMC, DB U50, p. 387). The other Courtright heirs remained involved with the Bolton operation.

W.L. Bradley (Carolina Fertilizer)

Although previously associated with Carolina Fertilizer, Moses (1882:519) reports Bradley conducting business under his own name, with land mines at Rantowles Creek – what we know as Bulow Mines. Wyatt (1891:55) lists the capital at $250,000. These operations are listed under Bulow by the *News and Courier* article, "There's Millions in It," reporting that the mines produced 30,000 tons using a work force of 350. Not surprisingly, given the

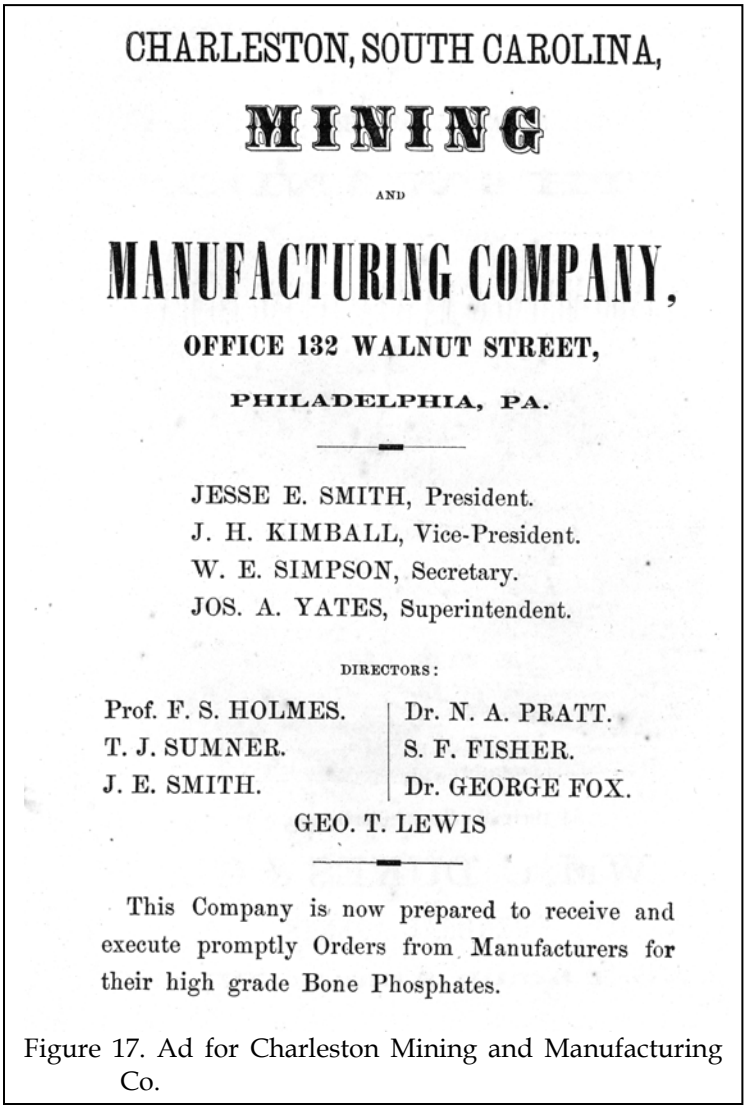


Figure 17. Ad for Charleston Mining and Manufacturing Co.

exceptionally large company he represented, Bradley was given an A+ credit rating (R.G. Dun & Co. 1889).

Campbell and Hertz

This firm is mentioned by Wyatt (1891:55) as mining on Rantowles Creek, although it had only $50,000 in capital.

Carolina Fertilizer (W.L. Bradley)

Holmes (1870:84) mentions this firm, noting they were working at Eight Mile Pump on the Northeastern Railroad on lands owned by a Mr. Masseau (Massot), leased to a Mr. Moses, and worked by W.L. Bradley. The resulting phosphates were sold by George W. Williams & Co. The Edward Willis Scrapbook (South Caroliniana Library) notes that this company was mining at 9 Mile, Bolton, and the Bulow Place (see also Anonymous n.d. a). In contrast to many other firms, Carolina Fertilizer was given only a "good" credit rating by R.G. Dun & Co. (1889).

Charleston Mining and Manufacturing Co.

Briefly discussed above, the company began with $100,000 in capital and over 10,000 acres of phosphate lands on both sides of the Ashley River, with leases on 10,000 additional acres. Their initial operations were confined to mining the rock which was shipped in its crude state to Philadelphia (Anonymous 1870:76; see also Holmes 1870:74-77). The mine produced 60,000 tons using a labor force of upwards of 800 – 300 of whom were Italians, the rest African Americans (Anonymous 1884). The article also reported that the stock paid an unbelievable dividend of 14%. Those laboring for these profits were being paid an average of $1.00 a day. One of the early properties, the 922 acre Maryville-Soldiers Retreat Plantation on the Ashley River, became known as Lamb's for its former owner, David W. Lamb. Lambs Mill was the most convenient for the Drayton Hall mines across the river, and its railroad stop became a center of activity. About 1890 the company gave up its works at Lambs to build a new Ashley River plant at Fetteressa Plantation (today with the Evanston Estates neighborhood), only later to return to Lambs (Fick and Stockton 1995:55-56; see also Chazal 1904:61-62). The 1890 South Carolina Business Director (Anonymous 1890) locates the company at Fetteressa.

Chicora Mines

Holmes notes only that this company owned mines on Filbean Creek (Holmes 1870:84).

L.W. (or Laurens N.) Chisolm

Listed by Moses (1882:519) this individual was reported to have land mines on the Ashley. The 1884 *News and Courier* article, "There's Millions in It" reports that the Chisolm works, with $60,000 capital, produced 10,000 tons of rock using 175 laborers. The property, with 640 total acres, had about 125 acres of rock. The "Chisolm Mines" continues to be mentioned into the early twentieth century (Watson 1916:106). The 1889 credit report listed this company as in the phosphate business with less than $75,000 in capital and a "good" credit rating (R.G. Dun & Co. 1889).

Cox (William Cox)

The *News and Courier* article, "There's Millions in It," reports these works on a 318 acre tract, with only $5,000 in capital, were producing only 600 tons using 10 workers. We know that William Cox was also in charge of the field work at the Bulow mines (Anonymous 1884).

Dotterer

Although listed as the Superintendent of the Wando mines, Wyatt (1891:55) suggests the individual, with $25,000 in capital, may have struck out on his own. This is also suggested by the *News and Courier* article, "There's Millions in It," that reports a Dotterer with $50,000 in capital removing 6,000 tons of rock using 50 employees. This may also have been Dotterer & Ravenel (Mappus 1938:44). The firm, listed as Henry Doterer, was given only a "fair" credit rating, with capital listed as less than $2,000 (R.G. Dun & Co. 1889).

Drayton's Phosphate Mines

These works were mentioned by the News and Courier (1884:54; see also Wyatt 1891:55) and were located on the Ashley River. The mines annually produced about 10,000 tons using around 180 workers (Anonymous 1884). McKinley (2003:146-151) provides additional background, including the brief and under funded efforts to mine the Drayton property by Frank H. Trenholm, the son of George A. Trenholm.

Eureka Mining Co.

Wyatt (1891:55) lists this firm as having $40,000 in capital and operating on the C&S Railroad in the Jacksonboro area.

Farmers' Fertilizer Co.

In 1870 this company "contemplates digging for phosphates and manufacturing sulphuric acid" (Anonymous 1870:78). Its capital was listed at $200,000. The president was William G. Whilden and Henry T. Peake was the superintendent. They apparently had lands at Phosphateville, as well as on Shipyard Creek, "contiguous to the Etiwan works" (Etiwan was initially the Sulphuric Acid and Superphosphate Company and it appears to have only produced fertilizers). Holmes announces that they were erecting a fertilizer mill on the Ashley River and they claimed capital of $150,000. As for mining, he notes only that they "have lands under their control" (Holmes 1870:86). The firm was given a "good" credit rating in 1889 (R.G. Dun & Co. 1889).

F.C. Fishburne

Listed by Moses (1882:519) this individual was reported to have land mines on the Edisto. Wyatt (1891:55) listed the mine location as the Pon Pon River, with the company reporting only $50,000 in capital. The mine apparently opened in 1874 on about 6,000 acres of land using blacks and Italians (Anonymous

1884). The firm is reported to have had less than $10,000 in capital and a "good" credit rating in 1889 (R.G. Dun & Co. 1889).

Julian F. Fishburne

Listed by Moses (1882:519) this individual was reported to have land mines on the Ashley at Middleton Plantation (Mappus 1938:39). The 1890 South Carolina Business Director (Anonymous 1890) locates F.C. Fishburne at Jacksonboro.

Gregg's Phosphate Mines (see also Horse Shoe Mines)

Moses (1882:519; see also News and Courier 1884:54) notes that these mines were on the Ashley (at the 4,000 acre Wragg Smith place) and were operated by William Gregg. Wyatt (1891:55) reports only $50,000 capital; nevertheless, 30,000 tons of rock were mined by a force of 350 workers – 150 of whom were convicts, the remainder African Americans (Anonymous 1884).

Hannahan Mines

Wyatt (1891:55) identifies these mines as being on the Cooper River although the company had only $50,000 in capital.

Harleston & Cheves

Listed by Moses (1882:519) the company was reported to have land mines on the Ashepoo River. It ceased operation by 1884 (Mappus 1938:45).

Hertz & Warren – Archdale Mines

Wyatt (1891:55) lists this company, operating on the Ashley River (at Archdale Plantation), as having only $20,000 in capital.

Horse Shoe Mining Co.

Wyatt (1891:55) reports this was another William Gregg company, operating on the Ashepoo River (likely at Horse Shoe Plantation) with capital of $50,000.

Hume and Smalls

Mappus (1938:45) indicates that this land rock firm was defunct by 1884.

Ingleside Mining and Manufacturing Co.

Francis S. Holmes' Ingleside Mining and Manufacturing Co. was chartered in 1896, building a plant adjacent to the South Carolina Railway tracks on Ingleside, the former rice plantation Holmes had acquired in 1871. As late as 1903 when the factory was destroyed by fire, the company pledged to rebuild (Fick and Stockton 1995:55-56).

Kiawah Phosphate Co./Meadville Mines

Listed by Moses (1882:519) the Kiawah Phosphate Company was reported to have land mines on the Cooper River. Mappus (1938:45) suggests that it ceased operation by 1884 although R. G. Dun & Co. (1899) reported the Kiawah Phosphate Co., with E.J. Meade, Proprietor, as mining phosphate rock, but maintaining only a fair credit rating at least five years afterwards. Wyatt (1891:55), however, lists the Meadville company, headed by E. Meade, as operating on the Cooper River with $300,000 in capital.

Lindstedt (John G. Lindstedt)

This firm – or mine – is mentioned in the 1884 *News and Courier* article (Anonymous 1884) as having what must have been a very small plant valued at only $5,000 and producing only 1,000 tons using 75 workers. It was located on the 24 acre Palmetto Island in Rantowles Creek.

Mount Holly Mining & Manufacturing Co.

Mentioned by Wyatt (1891:55), this company is reported to have had $50,000 capital and was mining in the Mount Holly area, near the Northeast Railroad line.

Oak Point Mines

Their land mining operations were at Wimbee Creek, 18 miles from St. Helena. The company was owned by private parties, George S. Scott from New York and D.U. Jennings (Holmes 1870:81). McKinley (2003:142) reports their work focused on Kean's Neck, between North and South Wimbee creeks. In 1884 W. H. Hand was manager at Oak Point, where J. Van Eason had previously been a supervisor or manager (Clarence W. St. Amand Journal, pp. 28, 45, South Carolina Historical Society).

Pacific Guano Co.

This firm boasted $1,000,000 in capital and began operations in September 1869 (Chazal 1904:62). It operated its own mines, at least briefly, on Chisolm's Island and in Edisto region, not far from Jacksonboro on the Edisto River (Anonymous 1876:10, 44; Chazal 1904:62). Survey site 1200293 is a series of parallel ridges and pits, remnants of land mining on Chisolm Island. These appear to be both land and marsh deposits, but the description suggested they were both mined using traditional land rock techniques (Anonymous 1876:44). Chazal (1904:6) notes that the land rock proved to be unprofitable and that most of the effort was then devoted to the marsh rock. They were producing about 16,000 tons of rock using around 100 workers (Anonymous 1884). The company established its fertilizer and acid plant near Charleston, "just above the forks of the road" (Chazal 1904:77). Holmes (1870:87) doesn't mention any mining, only that the mills were located outside the city, St. Julien Ravenel was the chemist, and J.N. Robson was the business agent. By the next decade Moses reports this firm was conducting land mining on the banks of Bull River (Moses 1882:519; News and Courier 1884:54; Wyatt 1891:55).

Palmetto Mining and Manufacturing Co.

This company owned Spring Farm on the Ashley River, 16 miles north of Charleston and opposite the Middleton property. At the time of the assessment they were in the process of erecting a wharf and buildings. T.D. Easton was the president and they were distinct from other companies in that they intended to sell the ground phosphate directly to farmers, rather than to a fertilizer firm – cutting out the middleman (Anonymous 1870:78). Holmes indicates the president was T.D. Lawson and that the company, with 100 operatives, had already dug 2,500 tons (Holmes 1870:86). By 1879 South Carolina's Inspector of Phosphates mentions that they were a river mining company operating in the Ashley River. By 1882 the company was doing little or no mining, likely because the rock was either not plentiful or of particularly good quality (Anonymous 1879, 1882b).

Phosphate Mining Co., Ltd.

This company is listed by R.G. Dun as having capital between $200,000 and $300,000, with a "good" credit rating.

Pinckney's Phosphate Mines

This mining operation, operated by C.C. Pinckney, is listed by Moses (1882:519; see also News and Courier 1884:54) as being on the Ashley River. The operations were on Magnolia Plantation and the capital was listed at $100,000 (Wyatt 1891:55). The mines apparently yielded about 24,000 tons of rock using 350 hands (Anonymous 1884). With capital listed at under $125,000, R.G. Dun & Co. (1889) gave this company a high credit rating.

Pon-Pon Phosphate Mines

Mentioned by the News and Courier (1884:54), their mines were on the Edisto River. The firm, with $10,000 capital, was producing about 6,000 tons using around 50 workers (Anonymous 1884).

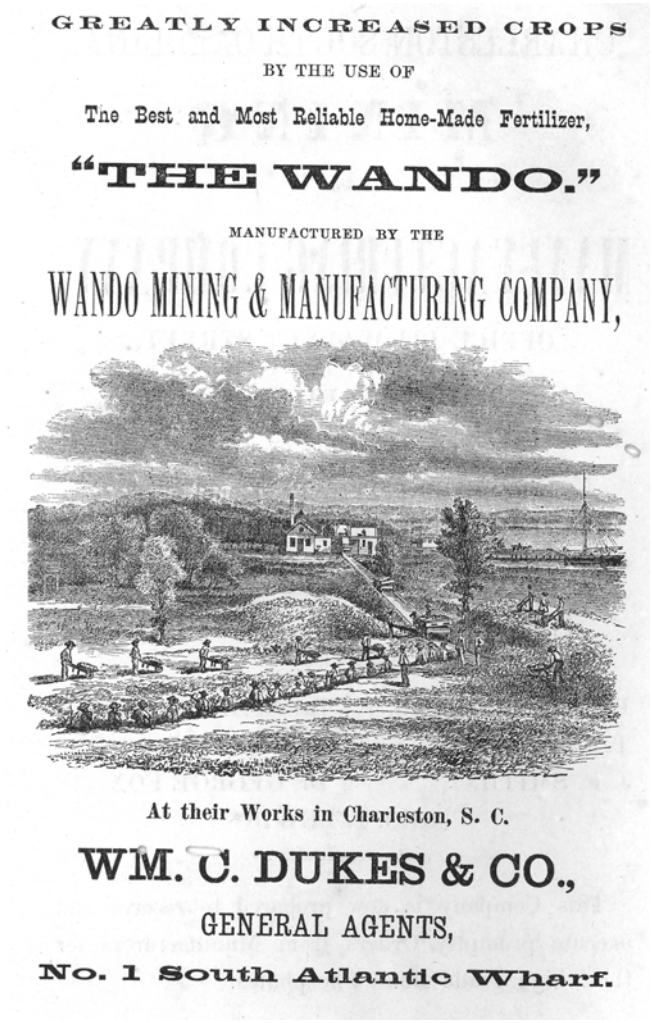


Figure 18. Ad for the Wando Fertilizer Co. showing an engraving of their land mining activities.

D. Roberts

Listed by Moses (1882:519), the company was reported to have land mines on the Stono.

Rose Phosphate Mining Co.

Listed by Moses (1882:519; see also News and Courier 1884:54) the company, owned by A.B. Rose, was reported to have land mines on the Ashley at Bee's Ferry. Wyatt (1891:55) indicates the company had $100,000 in capital. The mines produced 20,000 tons of rock using 277 workers (consisting of 180 blacks, 60 Italians, and 37 convicts) (Anonymous 1884). R.G. Dun & Co. reported capital of less than $125,000, but a high credit rating.

J.B. Sardy's Works

Holmes explains that J.B. Sardy recently purchased the Wappoo Mills and converted them from rice to phosphate. The company apparently had mines on the Ashepoo River, with offices in Savannah and New York. The business agents were George A. Trenholm & Son (Holmes 1870:87).

St. Andrew's Mining Co.

Listed by Moses (1882:519; News and Courier 1884:54) the company was reported to have land mines on the Stono. Wyatt (1891:55) reports capital of $200,000. The plant was valued at $50,000 and 300 workers yearly produced 18,000 tons of rock (Anonymous 1884). This company was reported to have less than $125,000 in capital, but a high credit rating (R.G. Dun & Co. 1889). The company was located near the Bolton Mine according to the 1890 South Carolina Business Directory (Anonymous 1890).

Stono Phosphate Co.

The president was James S. Gibbes and the company, with $500,000 capital, was mining at Happold's Farm on the Ashley River (Anonymous 1870:78). Holmes doesn't mention the mines, but explains that the company's stock was owned mainly by planters and merchants in the interior of South Carolina and documents only $350,000 in capital. A fertilizer mill was being erected on the Ashley. The chemist was Lewis R. Gibbes and the business was being managed by the firm of J.D. Aiken & Co. (Holmes 1870:85). In 1889 the company was given a high credit rating (R.G. Dun & Co. 1889). The 1890 South Carolina Business Director (Anonymous 1890) locates

Stone Mines near Bolton Mine, 16 miles from Charleston on the ACL Railroad.

George A. Trenholm & Son

Listed by Moses (1882:519) the firm was reported to have land mines on the Ashley.

Wando Mining and Manufacturing Co.

Also briefly discussed above, this company also began with $100,000 in capital. John R. Dukes was the initial president, with Thomas D. Dotterer listed as Superintendent (Anonymous 1870:76; see also Holmes 1870:78-79). In 1889 the company was reported to less than $125,000 in capital, but a high credit rating (R.G. Dun & Co. 1889).

Wayne and Von Kolnitz

Wyatt (1891:55) reports their mines were located on the Ashley River and that the firm had capital of $50,000.

Williman Island Co.

Wyatt (1891:55) reports that this land mining company was located on the Bull River and began with capital of $200,000.

Mining and the Miner's Life

There is general agreement concerning the activities involved in early hand mining of land rock, although there are relatively few detailed accounts dating from the first decade of the efforts. An 1871 tour of the Ashley River described the phosphate mines as "settlements," in the midst of what was otherwise a jungle of growth ("a land of ruins," "a wilderness," "luxuriant semi-tropical forest") that had overtaken once fine plantations (Jacques 1871). McKinley suggests that the first years of mining was "haphazard," with pits following deposits – the "random method pioneered by Homes and Nathaniel A. Pratt in 1867." In addition, clearing was minimal, with minors focused on open areas, emphasizing speed over thoroughness (McKinley 2003:172-173). This, however, conflicts with Haskell's later description of mined areas appearing as though "a whirlwind had passed over it" with trees "scattered her and there," resulting in a "sunny expanse of desolation; a desert with not a green oasis nor a sheltering palm" (Haskell 1882:411).

Wyatt explained the method of prospecting, in use at least by 1891 although likely used much earlier:

> A careful topographic survey is first made of the country, and when this has been done there commences a systematic series of bore-holes from any point that may be arranged, by means of a long steel borer or rod, specially designed for the purpose . . . . These bore-holes are practiced at distances of 100 feet apart over the total surface to be examined. The results obtained with the rod are verified and confirmed by a series of exploratory pits – 10 feet long by 5 feet wide – which are dug over the course of the bore-holes at intervals of 500 feet. The bore-holes are driven to a maximum depth of 15 feet, and no pits are at present sunk on those portions of the land where at that distance no phosphate has been encountered. Immediately after removing the overlying strata the phosphate is carefully taken out, its depth and thickness measured, and an average sample of the rock and nodules secured and laid aside for analysis (Wyatt 1891:49).

McKinley (2003:175) also reports the use of octagonal rods or probes, with depths estimated based on resistance, as well as 4½-inch pipes

rather than an auger (see Rogers 1915:210). Regardless, the effort at prospecting seems far more sophisticated than the initial mining efforts.

McKinley (2003:223-242) provides a compelling account of early mining operations by Williams Middleton. Middleton complained of the blacks' destitution and his need to provide food, tools, and "shanties." He complained about the "uncertainty of negro labor" – a theme that would be repeated over and over. The workers "go & come at their own pleasure regardless often of the sacrifice of wages" (quoted in McKinley 2003:230). Even those that did report for work (Middleton sought to operate his mines "a full week" – sunup to sundown six days a week) were unsatisfactory according to Middleton:

> We are subject to an infinity of trouble about our labour. So much depends upon negro caprice it is difficult to feel sure about anything. The hands break off upon every imaginable pretext. They do little or nothing before 12 o'clock on Monday, and never do anything after 12 o'clock on Saturday. [They are] all crazy upon the subject of "going to farming." Poor wretches! (quoted in McKinley 2003:231).

It seems that the African American laborers resisted Middleton's efforts to create gang work instead of their preferred task system (discussed below). As a result, those on a task system might mine about a ton a day, while those in gangs did only half as much work (McKinley 2003:232). McKinley also outlines Middleton's various pay schemes – including wages by the hour, day ($.75/day [$9 in 2002$]), ton, and barrowful (from $.10 to .12 [$1.27 to $1.45 in 2002$] per barrowful, which McKinley equates to approximately $2.04 to $2.76 per ton [$25 to $35]).

When wage increases failed to improve the situation, Middleton turned to housing as a means of attracting and retaining workers – a tactic that was used by many companies. He had the mine laborers build "pineland houses" close to the mines. Six double "coarse houses," each costing $86 ($1,088 in 2002$), were also built – and may have been typical of more permanent company housing. Middleton also thought that "ordinary negro houses," would not suffice and that "something better was required." How these "coarse houses" were better is unclear. It may be that the "ordinary houses," perhaps also the "shanties," were old slave houses, while the "coarse houses" were simply new and without the stigma of having been used in slavery.

Williams Middleton also felt the commissary store was a necessity, hoping it would tie the laborers to the mine. McKinley suggests that Middleton also anticipated charging inflated prices and thus improving his financial condition. This, however, apparently did not work out, as there were constant complaints of the store being robbed and goods being stolen (McKinley 2003:238-239).

We are also indebted to McKinley for his work with the 1870 and 1880 census records that provide a tentative view of the phosphate workers. Although his account should be examined, especially for all the caveats and warning that come with use of these data, we can provide a brief synopsis.

In 1870 the vast majority of the workers were living in group housing (of the 262 black phosphate workers, 252 were recorded in St. James Goose Creek and 242 of these lived in

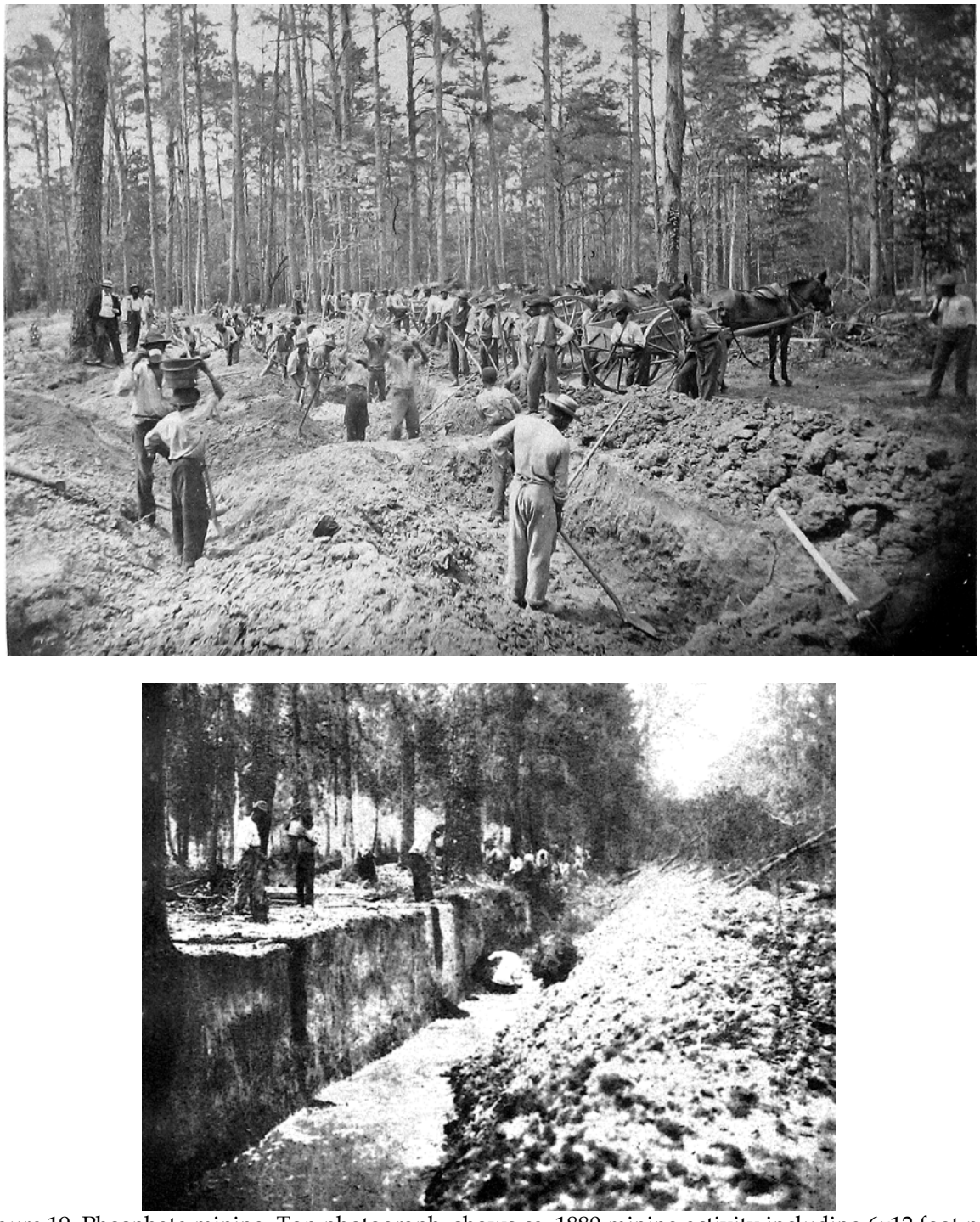


Figure 19. Phosphate mining. Top photograph shows ca. 1880 mining activity including 6x12 foot pits with phosphate rock thrown up in piles waiting to be moved to a tram by mule carts (courtesy of the South Caroliniana Library). Bottom photograph shows hand excavation of phosphate (from Waggaman 1913).

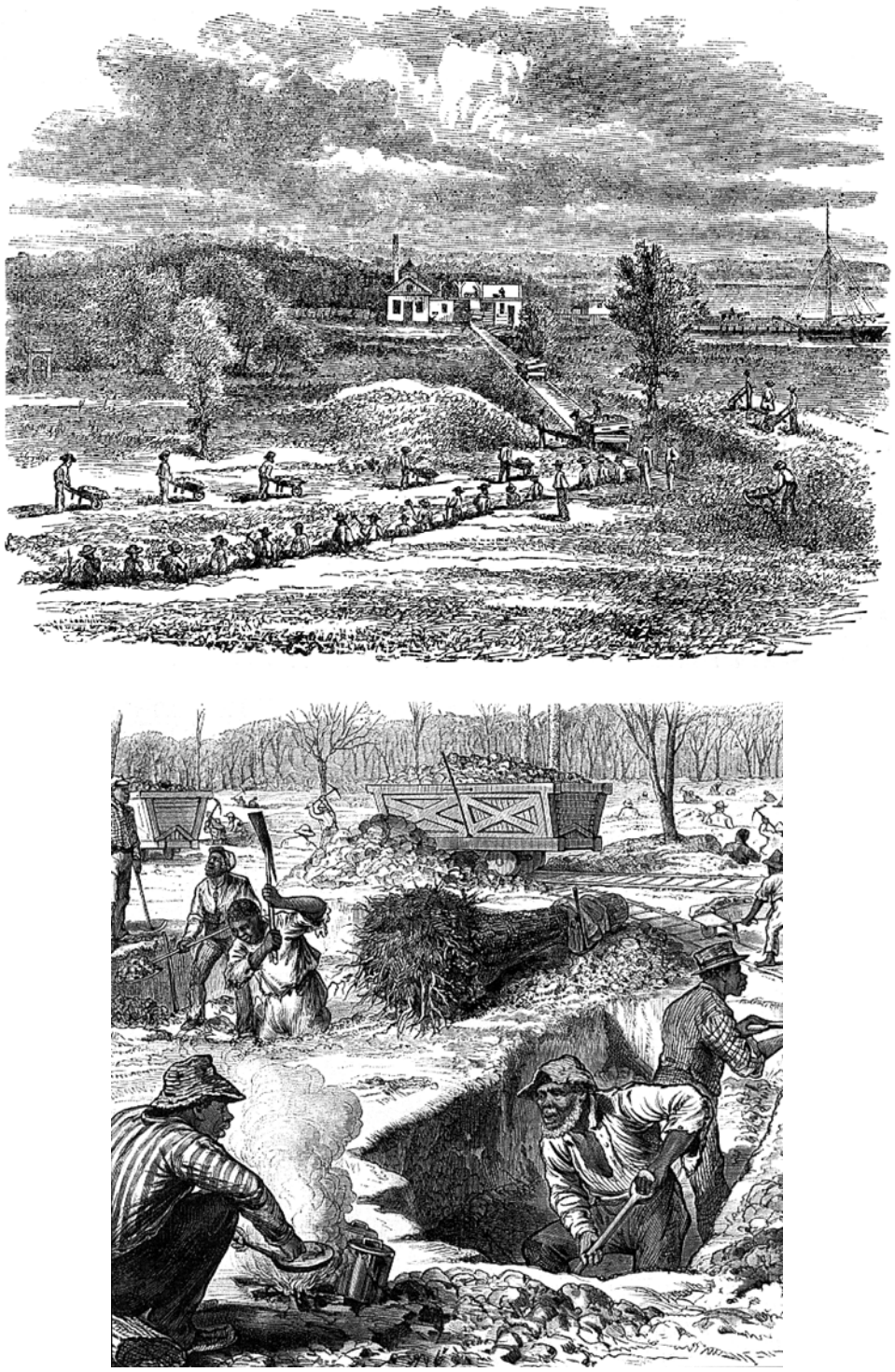


Figure 20. Phosphate mining. Top engraving is a view of hand excavation (from Wando Mining and Manufacturing Co. ad in Holmes 1870). Bottom is from Frank Leslie's Illustrated Newspaper (courtesy of The Charleston Museum, Charleston, South Carolina).

group housing). Very few could read or write and ages ranged from 12 to 61, with an average age of 31 years and most being in their 20s.

Looking at the 1870 census data McKinley reports three broad groups of workers: (1) rootless men – single miners without family who mined year-round, (2) seasonal miners – those who migrated to the camps as agricultural activities allowed and earned additional income, and (3) miners who lived their nearby families, working their farms and occasionally mining (McKinley 2003: 207-208).

Table 2.
Summery of Occupations and Average Pay Rates, 1891-1892 (from Wright 1893)

Occupation	# Employed	Day's Rate
Miners & Laborers	4090	$1.00
Dumper	41	$1.02
Fire Man	39	$1.18
Engineer	27	$2.27
Track Man	26	$0.98
RR Laborers	24	$1.00
Locomotive Engineer	21	$1.82
Foreman	15	$2.73
Carpenter	13	$1.63
Blacksmith	11	$1.45
Machinist	2	$2.55
Sorters	2	$1.00
Dipper Tender	1	$2.00
Chief Engineer	1	$4.17
Excavator Engineer	1	$2.40

McKinley also provides insight into the importance of phosphate mining. Although the census records (including the industrial census) are flawed and their counts of miners cannot be trusted, he was able to extrapolate the annual yield per hand for the listed companies to unlisted companies mining in 1870 – yielding an approximate total of at least 968 employees (McKinley 2003:213). This made phosphates the state's second largest industry, trailing only cotton manufacturing by less than 200 employees (McKinley 2003:222).

The 1880 census, while still flawed, is appreciably better. Most miners were still black or mulatto males, although four females are reported. Dubose Heyward, in *Mamba's Daughters*, included women in his mines, but admitted that it was unusual: "the mines were for men." Group housing, however, was no longer reported. Of the 63% who were married, most lived with their wives and children in single-family units. Most of the wives earned wages. Single men comprised the remaining 34% of the land mining workers and these lived alone or with families (McKinley 2003:244-245). The average age was 32 years, although the largest group continued to be in their 20s.

McKinley suggests that the change from group housing in 1870 to family housing in 1880 was at least partially the result of the mines moving west into the rural countryside where small hamlets of workers already existed (McKinley 2003:246).

The industry had at least 1,685 workers and likely many more given the vagaries of the census definitions and reporting. It still ranked second, far behind the tar and turpentine industry (4,512), but noticeably larger than lumber (1,431) (McKinley 2003:257).

Wright, based primarily on 1892 data, identified an average of 4090 "miners and laborers" at 23 South Carolina land mines, although the numbers may reflect the same miner being counted by more than one company. Regardless, this account provides an interesting view of the occupations present at the mines and the pay rate for that period. The data is presented in Table 2. The occupants include some, such as the excavator engineer and dipper tender, that were almost certainly associated with steam shovels or land dredges. Others, such as the fire man, might be found on either railroad locomotives or steam shovels. In spite of these problems, the list provides a good

view of the occupations one would expect at land mines. The average number of employees at the 23 mines ranged from a low of 47 to a high of 615.

An 1881 account of South Carolina's land rock miners elaborates:

> The land mines cover many hundred acres of ground; they are worked with picks and shovels. The whole tract has to be well and deeply trenched, and this is always done with reference to its natural drainage. Sometimes, however, all ordinary ditching proves inadequate, and the steam pump has to be continually used. The miners work in the trenches, a few feet apart, throwing the superincumbent earth behind them, and the phosphate rock in front. . . . It is then carried to the works . . . .
>
> The mining is done by negroes, although lately some companies have found it both necessary and profitable to import laborers. These imported laborers are mostly Italians. For negroes are agriculturalists, and taking far more naturally to the hoe and the plow than to the pickaxe and the shovel. Indeed, the labor it is so distasteful to them that just as soon as they earn enough to buy a peck of grits, some bacon and tobacco, they knock off work until the following week. They receive a dollar and a half a day in money, or a dollar a day and their rations; but they complain universally that this sum is far too little, and, considering the hard, the unhealthy, and unpleasant nature of the toil, I think the complaint not unjust. On the other hand, superintendents of mines claim that it is all the uncertainty of their labor deserves. I asked one man why he did not work regularly, and he answered with a yawn, "It too much tiring to work ebery day, Misses." I have seen negro laborers under all circumstances, but not even among the convict gangs of Georgia did I meet with such sullen faces. They were not only sullen and silent in the trenches, but sullen and silent when loafing on their own cabin steps with money in their pockets; and I note this circumstance as quite exceptional, for I have never before seen Southern negroes with nothing to do and a dollar to spend, who were not talkative and polite at least, or, more likely still, as merry as a lot of children on a holiday. The cabins of the miners consist of two rooms, equally dirty and comfortless. The women had nearly all a pipe between their lips, and their general squalor and untidiness seemed in keeping with their sullen, brutal tempers and ungracious silence ("Digging Phosphate Rock – Scenes at the Great South Carolina Mines," *New York Times*, October 18, 1881).

McKinley (2003:248) suggests that the reporter's paternalistic attitude "may have influenced the demeanor of her subjects," although discussions of miner housing are extraordinarily rare. Haskell (1882:412) also recounts the difference between most of the workers and "some few 'old-time' darkies, who retain the polished manners of their ancient training."

During a May 1881 meeting of Stono Phosphate Company's board, Col. C.H. Simonton proposed erecting houses for the workers on the company's property, suggesting "we could thus secure a more permanent and reliable class of laborers." While the board "thought favorably of this proposition" no action was taken – so while many companies attempted to retain workers by providing houses, not all were willing to make this commitment (Stono Phosphate Company, South Caroliniana Library).

An account of the mining at the Wando works provides another view of hand excavation:

> Making our way over ground already worked, we came to the open trench, where some one hundred and fifty hands were engaged with picks, spades, and forks, laying bare the deposit and throwing out the precious nuggets, destined to prove of more real value to the State than all the precious metals within our borders. . . . The nodules are thrown into large heaps, as they are taken from the mines, whence, after drying awhile, they are conveyed in small cars, running on a tram-way, to the mill (Anonymous n.d. b).

Moses offered an account of mining as done by well-funded companies such as the Charleston Mining and Manufacturing Company:

> A main trunk line leading from the washers (which may be a mile away) is laid, dividing the rock field into equal parts on both sides of it. Alternate laterals curve out and run at right angles to the main track as far as the boundaries of the designated field, but conforming to the intermediate ground. The laterals are 600 feet apart, and the space between any two of them is subdivided by a line ditch parallel to and midway between them. At this ditch two sets of workmen start their lines in opposite directions and at right angles to the laterals. This gives each man a space of 300 feet long and 12 feet wide to excavate. Over this path he wheels his "stratum" in barrows to his portion of a platform running at the side of the road. Here his work is sharply scrutinized by a foreman before it is loaded on the cars for a washer. This material furnishes about one-third in weight of the clean washed rock. When mining is carried on in wooded land it is difficult to keep the lines straight. Trees are undercut with mattaks [sic] and thrown behind upon the high ground, the rock being picked out from between the roots. Dynamite might here be used with advantage. The only tools employed are spades, shovels, and picks. In undrained territory or old rice fields where the alluvial character of the soil makes deep ditching impossible, steam pumps are employed.
>
> Recently Italians have been brought from New York during the winter, notably at Leland Yates's works . . . the negro, however, furnishes most of the labor. He digs about three days in the week, and is not to be depended on for regular work;

> but, when he fancies, can accomplish a great deal more than a white man in the same time. He is docile, and not given to strikes. The hand can earn from $1 to $2 a day. Irregular habits and distrust prevent his co-operating in working gangs under contract, which would tend to improve his condition (Moses 1882:513-514; Haskell 1882:412 also reports pay of $2 a day).

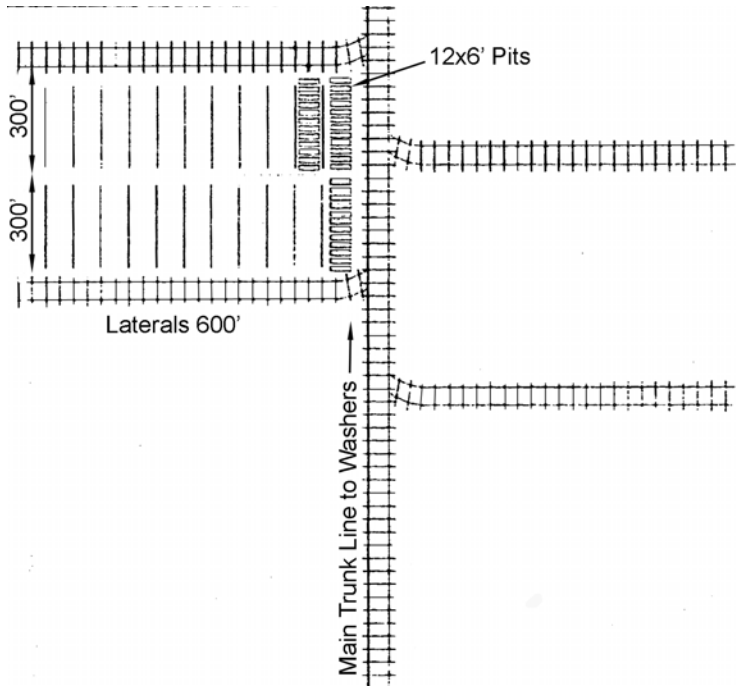


Figure 21. Mining operations based on Moses' account (adapted from McKinley 2003:Figure 3.9).

This account is particularly important since it documents the efforts by mining companies to find "consistent" industrial workers. Their efforts, however, were not without problems. Most fundamentally, white immigrant labor could only work the cooler season, limiting their usefulness. In addition, there were repeated accusations of abusive labor conditions. In May 1891 there were reports of problems with Italian workers in St. Andrew's Parish, although an investigation found that "what troubles they have arises from contracting debts among them." The article explained that the Italians brought to the mines were, "the very lowest dregs" and that, "they even eat turkey buzzards, thus exciting the disgust and contempt of the commonest negro labor" ("An Outrage Story Spoiled – Italian Phosphate Miners in South Carolina Eat Turkey Buzzards," *New York Times*, May 28, 1891).

These views are echoed in at least one oral history of a low country African American:

> Hit was the roughest kind of men come to work there – Irishmen, Italians, Polacks and all – some kind of furriners hit was. Couldn't hardly understand em when they'd talk. They had what they'd call kittle. A big pail or somp'n, and they just cooked out in the woods. Camping out. They even eat buzzard. They catch and eat a buzzard just as soon as you er me'd eat a turkey. That's just the way they was. Knock down a buzzard with a shovel er a rock, set up three sticks into the ground to hang up their kittle, build a fire and cook him right there. Hit was rough and mean crowd – most too bad for these Edisto colored to work with (Lindsay 1977:23).

In 1892 new accusations surfaced concerning the treatment of German workers at Pon-Pon Phosphate Mines. The claim was that the Germans were induced to work in the mines by the promise of earning $1.50 a day. Once they arrived they were reportedly detailed by armed guards and "herded into quarters with some seventy others, mostly Italians and Greeks." They were paid $.25 for each cubic foot of

Figure 22. Loading phosphate rock for transport to the washers. Top photograph shows loading into a hopper with the tram adjacent to pits (http://www.angelfire.com/sc2/tokenofthemonth002). Bottom photograph shows loading from wheelbarrows onto a flat car (Waggaman 1913).

phosphate mined, making at most $.75 a day. Out of this they were required to "provide their own food, purchasing all supplies at a store kept by the contractor, who charged high prices" ("Worked Under Armed Guards – Abuse of German Laborers in Phosphate Mines," *New York Times*, May 28, 1892).

In 1893 the abuse of Italian workers was in the news, with the report that a New York Italian, Antonio Galasso, hired other Italians to go to the phosphate mines "under the false pretenses of favorable climate, steady work, and high wages." The men reported "great cruelty while at work, and forcibly detained when they wished to get away, on the ground that they were in debt to the company's storekeeper" ("Galasso Will Have to Explain – Charged with Cruelly Deceiving His Countrymen," *New York Times*, January 26, 1893).

Abuse was again in the news in November 1897, when the *New York Herald* alleged that Philadelphia men were forced to work at Bulow by armed guards. They also alleged inflated prices, poor housing, and inadequate food ("Workmen Suffer on John's Island," *New York Herald*, November 26, 1897). While there may have been a thread of truth in the allegations, the *New York Herald* was the most sensationalist of the New York tabloids. And the article was not picked up by the *New York Times*.

In addition to the use of Italian, German, Polish, and Greek laborers, the mine operators also resorted to the use of convict labor (McKinley 2003:248-250). The phosphate mines accounted for 10% of the state's leased convict labor in 1880, but 84% the following year. The state received between $10 and $12.50 a year for each convict, with the mine responsible for feeding and housing.

One article explained that since the mines were located in "malarious" regions, "the few native white men who superintend the work seldom venture to spend a night in the deadly locality, but come into Charleston or the neighboring towns by the afternoon trains and go out to their work again in the early morning." Only the "negroes and hardy Italians" were able to survive the swampy lands that the rock mines were found in ("Mining Phosphate Rock, *New York Times*, January 29, 1891; Haskel 1882:412 comments on workers digging pits with "water up to the ankles").

Clearly executives, officers, and white supervisors did not live near the phosphate mines (or the fertilizer plants). The Charleston and Savannah's daily service connected city businessmen to depots in St. Andrews Parish. Other mainline railroad companies running up Charleston Neck allowed a comfortable daily commute to phosphate and fertilizer plants on both the Ashley and Cooper rivers. In 1899, streetcars finally made public transportation widely available when the Charleston Consolidated Railway, Gas and Electric Company extended the electric trolley line up Charleston Neck to Chicora Park (which soon became part of the Charleston Naval Shipyard) (Fick and Stockton 1995:31). Workers in Neck-area plants could now travel easily to their homes near or within the peninsular city. Beginning in 1912, white executives found that the new Charleston neighborhood of Hampton Park Terrace was convenient to their businesses on Charleston Neck. There is no indication that any of them ever lived close to their factories.

A decade after Moses' account of mining, a similarly detailed account is offered by Wyatt:

> it is customary to establish a main trunk railroad, starting at the river front or on the bank of some convenient stream, and passing right through the centre of the property to be exploited. Alternative laterals can be run off at right angles from any portion of this main line, at distances of, say, 500 feet, in

> conformity with the nature of the ground. Between and parallel to these laterals a ditch or drain is dug to a depth extending 4 to 5 feet below the phosphate strata. From this main drain the excavators start their lines at right angles to the laterals, commencing at one end of the field and cutting trenches 15 feet wide and 500 feet long, the work being so arranged that the men are stationed at intervals of 6 feet. Every man is supposed to dig out, daily, a "pit" 6 feet long, 15 feet wide, and down to the phosphate rock. The overlying material is thrown out to the left-hand side of the trench. The phosphate itself is thrown out to the right and taken in wheelbarrows to the railroad cars which pass at either end of the trench. The water drains from the trenches into the underlying ditch, and is thence pumped out by means of a steam pump worked by a locomotive engine. The pump and the engine are secured to connected railway platforms, and run along the railroad tract from one ditch to another as occasion requires (Wyatt 1891:53).

This view is substantially the same as offered by Haskell, who commented that, "the rock is generally conveyed to the cars in wheelbarrows, but often platforms are located along the line of the rail on which the rock is thrown, and immediately emptied into the care, thus saving considerable expense in the handling" (Haskell 1882:413).

By the early twentieth century Waggaman (1913:1) remarked that the "conditions in these fields have changed so materially" it was important to update the record. His description of the labor involved in hand mining is not materially different, although there may have been a changing relationship between the mines and the processors of the rock:

> Hand mining is usually performed on contract, a certain price being paid for the rock delivered at the washer. The contractor in turn pays the laborers by the task, assigning each man a section of the phosphate property, from which he removes the overburden and digs out the phosphate and loads it on the cars (Waggaman 1913:7)

The most significant change is found in his description of deep mining with steam shovels:

> Where the overburden is 8 feet or more in thickness steam shovels are employed to remove it. This machine digs a canal about 20 feet wide, depositing the overburden on one bank, while a hoist equipped with a single grab bucket, or a series of buckets to be loaded by hand, runs on a track on the opposite band of the canal. As fast of the steam shovel removes the overburden from the deposit the hoist is used to place the phosphate thus exposed on the cars. When the limit of the deposit is reached the steam shovel returns, dredging out a canal adjacent to that already dug and depositing the overburden in the old ditch. Many deposits which could not be economically worked by hand are now rendered valuable by the advent of

> machine mining. . . . Unfortunately for the South Carolina phosphate industry, the cost of production has increased with a corresponding advance in the price of phosphate rock. Indeed, the price of this material is now so low that the smaller operators in these fields have entirely ceased mining. The price of labor has also advanced from 30 to 50 per cent, and frequently it is so difficult to obtain hands that the output of rock is seriously curtailed (Waggaman 1913:7-8).

Thus we see the gradual movement from relatively shallow hand trenching to much more aggressive soil movement using steam shovels – each leaving a distinctive scar on the landscape (see also Shick and Doyle 1985:19) With the introduction of steam shovels overburden as deep as 22 feet was being removed (Rogers 1915:210, 213).

The equipment was often very complex. For example, the Osgood Excavator, used at least by the Pacific Guano Co. in Beaufort on Chisolm Island, combined a water tank, boiler and engine, an A-frame, boom, dipper-handle, and dipper. The excavator required an excavator engineer, fireman, a dipper-tender, and between five and 10 laborers. The dipper held 1¾ cubic yards of soil and was capable of excavating a trench from 25 to 35 feet in width to a depth of at least 15 feet. The equipment replaced upwards of 100 men, being able to excavate 800 to 1,000 cubic yards of soil every day.

One of the more interesting themes running through these accounts is the difficulty in securing laborers. Almost every account, newspaper article, or company report at least mentions the difficulty in finding and retaining labor. Over a decade ago historian Bernard E. Powers, Jr. understood that, "for some blacks the conditions under which they worked were as important as their wages" – and the rural freedmen "only desired to work in the phosphate industry to supplement their farm income" (Powers 1994:126). Consequently, at peak planting or harvesting times blacks would desert the mines and return to the farms. In slack times, when the crops could be maintained by children and wives, the men would supplement their income with mine work (Anonymous 1885).

This division of labor is still remembered by rural African Americans. One oral history recalls men working in mines during the week and returning home on the weekend, although there seems to be some question concerning exactly how much money returned home with them:

> But after that storm [1893 hurricane], can't make no crop no how, and he leave out. A whole army of the young men left out from here [Edisto]. He gone to work at the rock mine, the phosphate mine over at Red Top, call it Rock Field. He work there a while, make <u>good</u> money. Then the next year he come home again, help his old man. They make a good crop that year and the next. . . . Then he do just I done later on, he plant that year's crop with his daddy, and as soon as that crop is up, he gone off to try to get some kind of wages for us. . . . My daddy and my wife's daddy worked at the Rock Mines, the Bulow mines is where they worked. Daddy worked through the week, and came home on the weekends. The wages were very high, though only a little of the money paid to the men got home to Edisto (Lindsay 1977:19,22).

Figure 23. Land mining with steam shovels. The top photograph shows the shovel removing overburden and depositing it on either side of the pit. The lower photograph shows the subsequent phase of removing the phosphate rock and loading it in buckets that were then lifted out of the pit and dumped in rail cars (Waggaman 1913).

McKinley suggests that, "to many of those who mined, it was a seasonal and part-time job, good for extra income during slow times on the plantation, but hardly a career. Independent farming was their goal" (McKinley 2003:216). This view was earlier stated by Morgan, discussing the importance of the task system. He seems to suggest that while integrating farming with mining might have been a goal, perhaps even more significant was the freedman's desire "for autonomy not only from the impersonal marketplace but also from individual whites" (Morgan 1982:596).

Both Morgan and McKinley also note that low country blacks had a diversified subsistence base, successfully integrating farming, hunting, fishing and – at times – mining. The mines were, most fundamentally, a welcome supplement to agricultural pursuits.

We see in the historic accounts, including the census records, a movement from very early group housing and shanties to more substantive housing resulting in more stable mining populations. Yet in spite of the general theme, there are regrettably few descriptions of the housing at different periods. Of far greater interest, it appears, were technological descriptions of the process of mining.

Shick and Doyle (1985:17) suggest that not only housing, but also medical services and general stores were provided to induce year-round settlements. They cite a short article, "Colored Mining Labor" for support:

> The system of payment in checks or scrip . . . is common. This enables the miner to get provisions every evening at the store. At the end of the month, rent, doctor's bills, and the amount of scrip drawn, or money advanced, are deducted from the balance due for wages, and the balance is paid in cash. Many of the miners live on from $3.50 to $7.50 per month. Most companies employ their own physicians, and the employees are taxed to pay the doctor's salaries and the cost of medicines used. A few of the colored miners lay up a certain amount every month from their earnings. Most of them keep in debt to the storekeeper, or simply draw enough to support themselves as they go along, and on pay day receive the remainder and spend it within a short time (Brainerd 1885-1886:79).

Although Shick and Doyle don't mention that this article concerns hard-rock mining of iron ore and the author was writing from Birmingham, Alabama, we know that that the Bulow mines did have both a commissary and a hospital, proving additional credence to Brainerd's observations.

C.W. St. Amand was very interested in the business of storekeeping at low country phosphate mines, both in his capacity of bookkeeper for Wylie & Gordon, and as a family man hoping to increase his income. His "Merchandise Account at Oak Point Mine" for March through August, 1884, shows weekly figures for cash sales, which vary from $208 to $453, usually around $300 (Clarence W. St. Amand Journal, pp. 29-30, South Carolina Historical Society).

At least by February 1886 he was trying to acquire his own business. He wrote to William Guess at Latham's Mines, Johns Island (the depot on the mainland side of Stono River). Guess had told Mr. Jaudon that he [St. Amand] would like to rent the store now occupied by Jaudon, and St. Amand was "anticipating negotiating for his stock." Before committing himself, he wrote to "Tom": "I visited the place in question yesterday . . . . Arriving at the depot proper, take the main road north about ½ mile,

turn left or west, proceed about the same distance, which brings you to a store. It is situated about a mile from either Bulow or Latham's, and about ½ mile from Linsted's and 1½ from Bolton. It is the same place held by these parties for the last three years . . . . I think it an excellent stand, and if I can get the party you spoke about to stay up here, why I think it almost a surety, my success. I must have a settled person to stay up there as the place is very important, and trade commences just about the time the train leaves the depot (6:30 PM). I presume we can get Jenkins there by March 1st prepared to remain there . . . . "

A few days later he wrote Tom, "Jaudon tells me – in fact he guarantees me – that I will have no trouble about the checks, as Bulow (Stortell) [probably the Z. E. Sawtelle cited in 1888 *News and Courier* article as the superintendent of the Bulow mines] takes them at par, while Linsted and Latham's both 10% off. Bolton he cannot use, though he has taken some of them and sent them through the hands . . . ."

But St. Amand soon pulled out of the negotiations, writing to Jaudon later that February, "I find that the store at Red Top would not pay a sufficient return on the investment without the liquor business in connection with the groceries and dry goods, and I do not want to keep the former." With this, St. Amand turns away from the Red Top Store and opens negotiations for the business being kept by William O'Shaughnessy at Drayton Station. That fell through, and in January 1887 he is writing to Julius Fishburne, in Summerville: "Some time ago Mr. Jenkins endeavored to get the store at your works for me, without success . . . . He tells me I could rent if for $65 or $75 and that at present it's occupied by parties to whom you were not very favorably disposed . . . ." The letterbook ends soon after this entry, with St. Amand still not having found a store.

Although the account is ambiguous concerning the "checks" accepted by Bulow at par, while accepted by other nearby mines at 10% below par, it does reveal a complex interaction of local mines and merchants, suggesting that not all mines forced workers to use only their facilities. Moreover, it provides us with a general accounting of at least one merchant and points out that of all the items offered for sale, alcohol might have been most sought by the miners.

State business directories for 1890 (Anonymous 1890) list several general stores along the Charleston and Savannah Railway through St. Andrews Parish. There were three general merchants at Red Top, J.G. Lindstedt (previously discussed as a mine owner), R.D. Stelling, and H. Struhs. The Stono Station stop 16 miles from Charleston was known also as the Johns Island Ferry. A post office "for the convenience of the large phosphate interests centered here" was kept by J.C. Houston (manager of the Bolton mine). The W.L. Bradley Company kept a general store, as did independent merchant D.G. Utsey and Company. At Rantowles "just a small station," there were three general merchants. In 1889 R.G. Dun & Co. (1889) listed two general stores in Red Top: Lindstedt and Stelling. At Stono two others: W.L. Bradley and St. Andrew's Phosphate Co. At Johns Island, however, R.G. Dun listed 13 general stores and one dealer in groceries and liquor, H. Stubbs. At the Rantowles station there were two other general stores: J.T. Clark and P. Fox.

By 1905 (Anonymous 1905), the Charleston and Savannah Railway had become part of the Atlantic Coast Line system, but its depots remained centers of local commerce. At Red Top, a "small town nine miles from Charleston," were two general stores, John G. Lindstedt's and W.J. Wolfe's. Farther along was the Johns Island Depot, with a population reported as 1,000. This station stop remained the center of the phosphate world: there were three general stores (Bolton Mines, Joseph S. Hart, and John Johnson) and a clothing store. At

Rantowles, 19 miles from Charleston, were two general stores.

In 1912 the Johns Island station, with a population down to only 100, still had nine general stores: E. Ferri, Cyrus Gadsen, J.E. Glover, Joseph S. Hart, J.F. Limehouse, J.G. Lindstedt (listed as "near" the station), I.H. Lowry, Frank W. Rivers (listed as being "near" the Johns Island station), and Henry Struhs. Also at Johns Island was A. Banov, who sold shoes and clothing, and two mines, Bolton and Bradley. At Stono were two general stores, S.H. Jones and J.E. Sterling, and one druggist, J.L. Strohecker.

Processing and Industrial Activities

The level of phosphate rock processing varied tremendously. Some firms, such as Bradley, only washed their rock before shipping it either to northeastern fertilizer factories or overseas. Other firms also dried their rock, reducing its weight.

Looking back on the development of the industry, Waggaman (1913:6-7) observed that the earliest washing was perfunctory at best, consisting of washing the material by hand in a nearby creek. This was inefficient and resulted in a dirty product that degraded the value of South Carolina phosphates. Chazal (1904:49) remarked that the "rough scrubbing with hand brushes in a convenient creek" removed so little soil that initial cargoes of the rock "were so dirty that they had practically to be mined out of the vessels" in which they were shipped.

Waggaman (1913:7) reports that after hand washing was abandoned the South Carolina miners adopted log washers, such were being used in Florida.

Log washers are still used in mining today. What appears to be the first patent – although probably not the first use – dates to 1891. The device was invented by Samuel C. McLanahan, who used it to wash clay from the rock of his Florida deposits. These log washers consisted of long, gently sloping boxes or troughs in which were mounted logs with cast iron paddles attached. Earlier it appears that railroad spikes (which would have been plentiful) were attached instead. The logs – today shafts – were paired and counter-rotated, with the paddles or railroad spikes intermeshing to provide the maximum scrubbing. The paddles also subjected the material being cleaned to constant abrading, scouring, and grinding – all intended to clean the heavy plastic clays and even break down soft stone. The paddles slowly moved the material toward the discharge opening at the upper end of the tub, while the debris were caught up with overflowing water and passed through a grated opening at the lower end (Anonymous 2002).

Because the South Carolina rock was often found in a sandy matrix and the "elaborate cleaning process" typical of this type of washer was found to be unnecessary and log washers were also abandoned.

In the place of log washers Waggaman describes a simpler washer where the rock:

> is scraped in a hopper, which discharges into a mechanical conveyor composed of units holding one-half ton each. It is carried to the top of the washer, where each unit of the conveyor is automatically discharged, and a stream of water washes its contents down to a crusher. From the crusher it is discharged through troughs into the lower end of several cylinder washers, which vary in number from two to eight, depending upon the size of the plant. Each cylinder is 27 feet long and 5 feet in diameter, the discharge end being 14 inches higher than the end where the phosphate material enters. The

> first part of the lower end and the last 2 feet of the upper end are composed of heavy wire screen, having perforations of a dimension three-sixteenths by three-fourths inch.
>
> The interior of the cylinders is fitted with plates arranged in the form of a spiral [or screw] so that they throw the phosphate forward and toward the upper end as the cylinder revolves. A 2-inch stream of water under pressure of 60 pounds to the square inch is played upon the phosphate materials from the upper end of the cylinder. The washes the sand, clay, and finely divided phosphate down to the lower end of the cylinder where it escapes through the screen and then flows out through a trough to the wash head, which is usually located at some distance from the plant. The washed rock falls from the upper end of the cylinder upon a rubber-coated belt 26 to 30 inches in width, along which it is carried to the wet bins. Pickers are stationed along this belt for the purpose of removing clay balls, marl, and any other foreign material which may be mixed with phosphate (Waggaman 1913:7-8).

Waggaman reported that such washers could clean from 150 to 600 tons of rock every day. It appears that these new washers were little more than modified log washers – a single screw assembly was used in place of double logs, but the device was still elevated, it still pushed the material along its pathway, and it still used water to remove the sands and clays.

Wyatt generally confirms this account, explaining that from the mine the rock is shipped by tram to the washer:

> constructed at an elevation of some 30 feet from the ground, and generally consisting of a series of semi-circular troughs 20 to 30 feet long, set in an iron framework at an incline of some 30 inches rise in the length. Through every trough passes an octagonal iron-cased shaft provided with blades so arranged and distributed as to form a screw with a twist of one foot in six, which forces the washed material upwards and

Figure 24. Photograph of the washer at Lambs. This twentieth century view represents a more refined washery than would have been used at late nineteenth century mines.

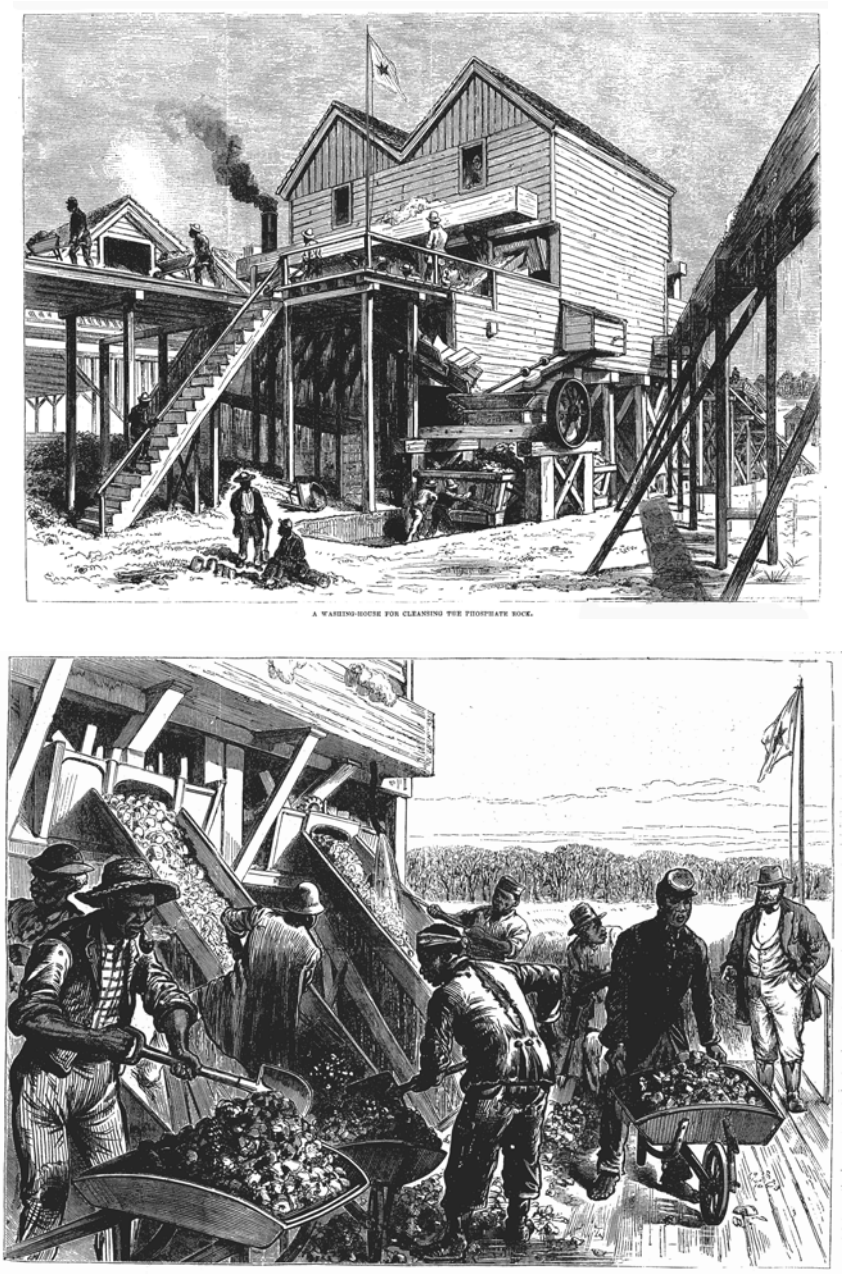
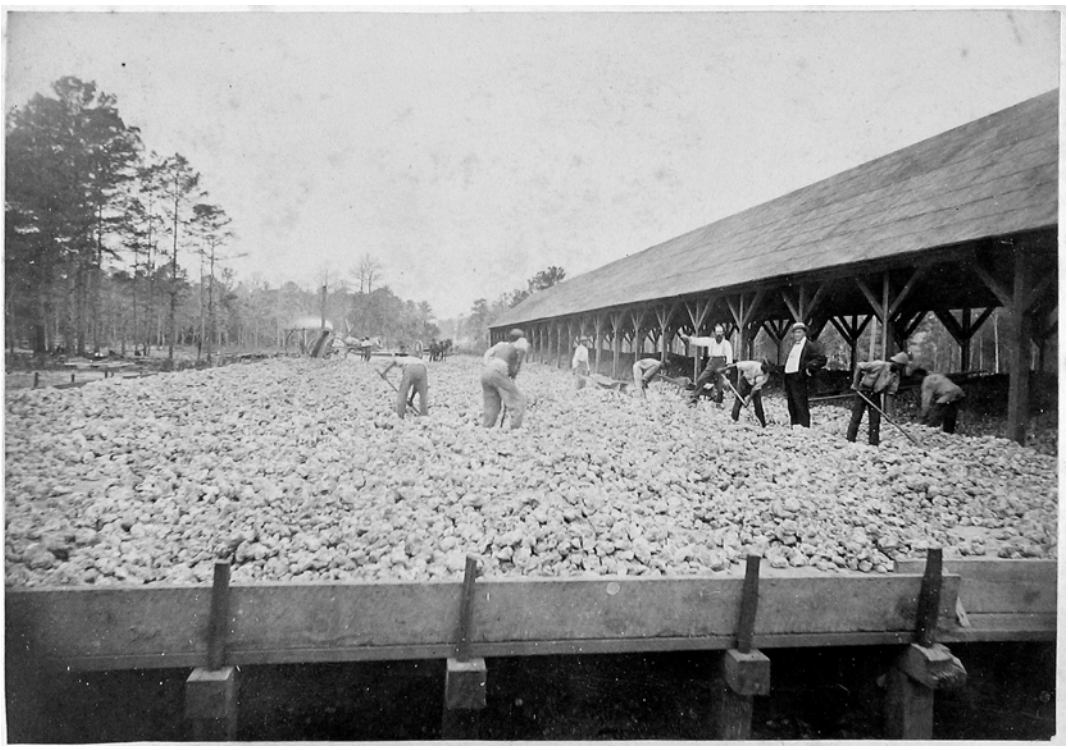


Figure 25. Washers as illustrated in *Frank Leslie's Popular Monthly Mazagine*, 1882 (courtesy The Charleston Museum). In the upper illustration the rock is being drawn up to the washer in the rear, screw washers are seen at the front, and a sluice is shown transporting the debris to the right side of the illustration. Workers are shown carting the cleaned rock off to the left. On the side of the building there is a grinding mill, but its relationship to the other operations is unclear, as is the car being pushed under the mill to catch the ground rock. The lower illustration shows the "semi-circular troughs" into which the phosphate rock is being removed after cleaning (although technically the rock was forced upward, not downward as shown here). The illustration shows only one trough using water and there is no indication of its overflowing.



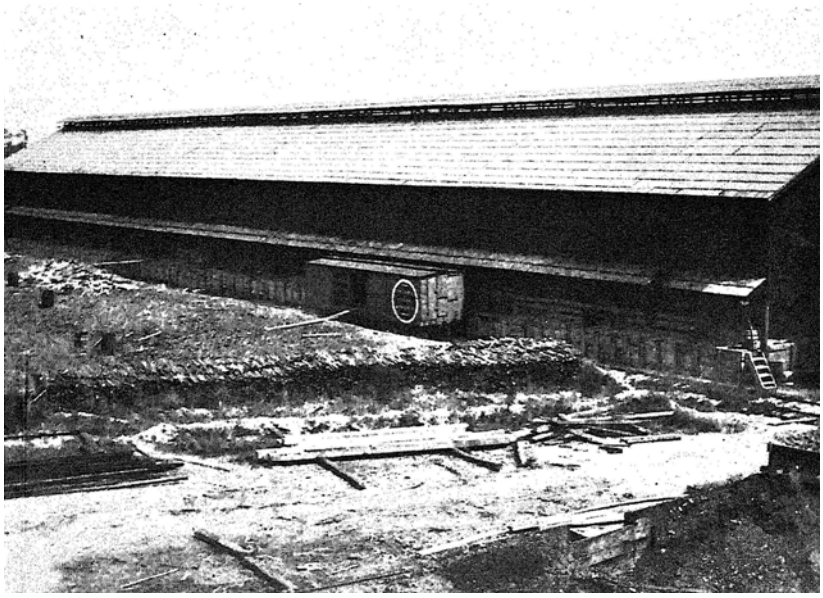


Figure 26. Drying of phosphate rock. The upper photograph (courtesy of the South Caroliniana Library) shows what appears to be open air drying using workers to constantly turn the material – similar to the situation reported for Bulow. This activity, while documented early, was supposedly replaced by kiln drying. The lower photograph (from Waggaman 1913) shows the drying and storage shed. We have found no photographs of phosphate being dried using a kiln.

> projects the fragments against each other. The phosphate-laden cars are hauled up an incline and their contents dumped into the bottom trough, where the phosphate encounters . . . heavy streams of water, pumped by a steam-pump. This water does not run off at the bottom, but overflows at the higher end near where it enters. When sufficiently washed, the material is pushed out upon a half-inch mesh screen; the small debris being received on oscillating wire tables below (Wyatt 1891:53-54).

The differences in the two accounts (and the nearly identical description of Rogers 1915:212) are minimal and likely are the result of describing slightly different versions of the same equipment. Lindsay's oral informant, Bubberson Brown, reported that a characteristic of the washer was the sound it made as the rock hit the metal tubes and screw blades (Lindsay 1977:22). Haskell (1882:414) also describes (and illustrates) a washer. The only substantial difference is that she explains the rock "gradually works it way down toward spouts," while all other accounts are uniform in describing the screws as forcing the rock upwards.

Chazal tells us that the first washer built by the Charleston Mining and Manufacturing Company (known as Washer No. 1) :

> was given practically no elevation above the ground, and all the material had to be rolled up on the rock piles in barrows. The costliness of this handling was soon realized, and the No. 2 Washer, erected in 1869, was considerably elevated (Chazal 1904: 50).

This suggests that the elevation (which Washer No. 1 lacked) was intended to allow the debris to collect under it and without an elevation (and presumably a tram road leading to the washer), the material to be processed would need to be unloaded and carried through the debris field and loaded onto the washer by hand – clearly a very labor intensive undertaking.

Moses (1882:515) tells us that many companies allowed the "solid portion of the dump [to be] flowed upon adjoining marshes" or dumped directly into the river that provided the water for the washer. That same year the Inspector of Phosphates complained to the legislature:

> [the] practice too frequently prevailing among the Land Companies of emptying their debris into the navigable streams and rivers of the State, these companies usually erect their machinery, washers, &c., on the shores of such streams, not only for the purpose of obtaining a fully supply of water for such washers, but also for more ready means of shipping their rock, the deposit as dug from the soil is brought from the mines in tramways to the rivers or streams, where it is washed and crushed. The rock is shipped, while the sand and mud, constituting fully one-half of the stuff removed from the mines, is emptied from a shoot into the river (Anonymous 1882:186).

This, the Inspector reported, was causing navigational problems. We have not learned whether the legislature took steps to stop the action.

Rogers (1915:212) observes that "much" phosphate was lost during the washing.

Upwards of 60% of the material taken to the washers is sand, clay, and finely divided phosphate that is screened out. One estimate indicates that nearly 8% of the material mines, or as much as 20% of the phosphate present, is lost to the waste piles. The problem was far worse in some areas, such as around Tenmile Hill, where the rock was reported to be so friable that a very large amount was lost in handling and washing.

From the washers (and perhaps the pickers, although this action is not consistently reported; see Haskell 1882:414), the rock might be transported by either tram or conveyor to some facility for drying. As previously mentioned, however, not all firms dried their rock.

Chazal explains the earliest method, with the rock placed in covered bins, open at the front. Hot air was then distributed through perforated pipes laid near the bottom of the piles. He remarked:

> The drying action was necessarily very uneven. The rock next to the pipes was thoroughly burnt and frequently calcined, particularly near the point of entrance of the hit air, where the heat was, of course, greater. Toward the opposite end of the shed, and as the distance of the rock from the pipes increase, the heat and drying action diminished very materially, so that the bulk of the mass received little more than a fairly thorough drying. . . . In addition to this the cost of the pipes was great and their durability small (Chazal 1904:16).

Haskell (1882:414) describes the rock being piled "over perforated flues, through which heated air is blown into a strong blast from the furnace, and passes through these masses of rock, drying it." It appears that this approach was abandoned by many companies about this time (for example, the Charleston Mining and Manufacturing Company, see Chazal 1904:50) and replaced with:

Figure 27. Lambs Mine (Charleston Mining and Manufacturing Co.) drying shed (courtesy South Caroliniana Library).

> burning the rock in sheds, open on all sides, on wood carefully piled to permit a proper draft. The heat evolved is intense, that furnished by the wood being materially increased by the combustion of the organic

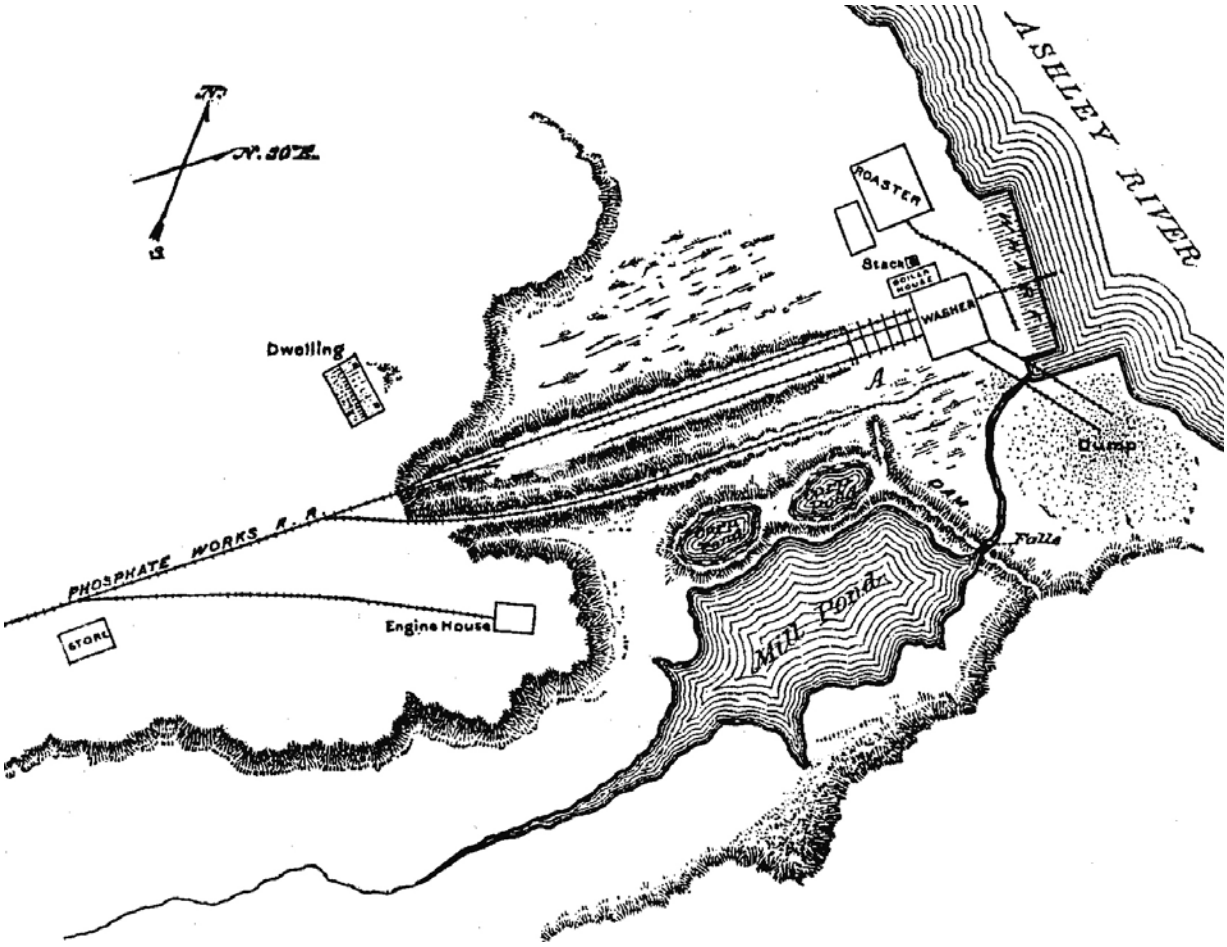


Figure 28. Gregg's phosphate works on the Ashley River showing the washer, boiler house and stack, and roaster. The dump for the waste material is southeast of the washer, adjacent to the river (McGee 1986:300).

> material of the rock, and also by the formation and combustion of water gas (Chazal 1904:16).

Waggaman (1913:8) describes substantially the same process, explaining that from the washers the rock was placed back in cars and transported to a drying shed, where it was "burned on ricks of wood" with about 8 cords of wood required for every 100 tons of rock. Wyatt, in 1891, described the drying process in the same way:

> that of simple roasting in an ordinary kiln, such as is generally used in the manufacture of bricks, is said to have been found at once the most rapid, effective and economical. . . . The rock is built on layers of pine wood, and owing to its containing a considerable quantity of organic matter, is readily lends itself to combustion and requires but a short time to become quite red-hot (Wyatt 1891:54).

Wyatt further explained that the kilns were constructed to "allow free passage to a train of cars, which, running on the main line of railroad, can be loaded in the kiln, run down to the landing place and discharged directly into the barges or boats on the river (Wyatt 1891:54).

Moses had reported that the earlier technique of drying using heated air was still being used, at least by some companies, in 1882, when he reported the use of high powered Sturtevant blowers drawing air through a wood burning furnace and down a 100 foot long brick flue to the rock. These drying sheds were 100 by 400 feet in size (Moses 1882:515). He also reported that at least some rock was only air dried (as opposed to mechanically dried).

While hot air drying reduced the moisture content of the rock (as high as 15% after washing) to perhaps 2%, several authorities remark that kiln drying would reduce moisture content down to about 0.5% (Chazal 1904:17; Waggaman 1913:8).

There are few detailed plans of phosphate processing facilities. One is the plan of the track and washers at Gregg's Phosphate Works, produced after the 1886 earthquake, during the height of the phosphate industry. We see the phosphates being delivered directly to the "Washer." Although the source of the water is not identified, it was probably the nearby Ashley River. Adjacent to the washer was the boiler house – necessary to pump the water, and operate the conveyors and screws. The dump area for the washers is clearly shown to the northeast.

To the north of the washer, and probably connected by conveyor, was the "Roaster," or drying shed. This sketch does not indicate the type of dryers being used, but the implication is that blowers, powered by the nearby boiler, were being used, with the furnace perhaps in the unlabeled building to the southwest.

From the drying shed the rock would have been transported by rail back to the wharf, where it would then have been loaded for shipment. This particular drawing does not show any grinders or acid chambers, suggesting that fertilizer processing was not taking place on the site (see the discussion of fertilizers below).

The Fertilizer Industry

From the washers (and perhaps the dryer) phosphate rock might being be loaded in ships for transport to a northeastern or foreign fertilizer factory – or it might be processed into fertilizer at any one of a number of Charleston plants, typically being transported by rail.

The development of phosphate mining can only with great difficulty be separated from the simultaneous development of South Carolina fertilizer industry. In fact, the Sulphuric Acid and Superphosphate Company (subsequently the Etiwan Works) – the first company to manufacture this critical acid for fertilizer production in the South – applied for its charter in May 1869, but actually began operation the previous August, producing its first acid in December 1868. While this earliest effort used sources of phosphates other than South Carolina rock, as the industry stabilized, local factories used local materials.

Some factories simply ground the phosphate rock to a fine powder, known as "floats." The Ashley Phosphate Company explained:

> Floats is phosphate rock reduced to an impalpable powder, so fine that it will float in the air. All the floats that is offered by the Ashley Phosphate Co. is ground by the Duc Atomizer out of high grade Phosphate Rock, and it will be found of superior quality in every respect. This extreme reduction is accomplished by the use of the Duc Atomizer Mill, invented by Mr. H.A. Duc, Jr. of Charleston, S.C. By the attrition of Rock against Rock, in a revolving hollow disc the grinding is effected, and the product is removed by suction.
> (Anonymous 1882:27).

Other companies, as well, offered this product. In 1881 the Annual Report of the Stono Phosphate Company announced that , "the finer grinding of Rock has become more than ever an imperative necessity . . . . [resulting in] the introduction into our works of the Duc Atomizer Mill" (May 3, 1881 Annual Report, Stono Phosphate Co. Minutes, South Caroliniana Library). By 1886, however, the company found "almost no demand" for floats and the use of the Duc Mill was discontinued.

Many mills processed the rock to produce what was called superphosphate (sometimes called acid phosphate). Superphosphate was the chief material supplying phosphoric acid in fertilizers and is considered the basis of the modern fertilizer industry. The insoluble phosphate rock was converted to soluble superphosphate and gypsum, with the superphosphate generally containing 14 to 16% available phosphoric acid. Memminger (1883) explains the process involved four basic steps: the manufacture of sulfuric acid, the drying and grinding of the rock, the mixing of the acid and ground rock, and finally, the "disintegrating and screening" and bagging of the fertilizer.

Although the fertilizer companies initially purchased their sulfuric acid from northeastern manufacturers, this was costly. Memminger explains that the local companies (like the Sulphuric Acid and Superphosphate Company) began building their own "sulphuric acid chambers" – lead lined rooms with piping to introduce steam. Connected to them were furnaces where sulfur was burned in the presence of air to create sulfur dioxide. The sulfur dioxide gas was then mixed with air, steam, and oxides of nitrogen (created using nitrate of soda to produce nitric acid). These react in the lead vessel to yield sulfuric acid as fine droplets that fall to the bottom of the chamber. The resulting acid is not particularly pure and is only about 62 to 70% sulfuric acid, with the rest being water.

Another account explains that superphosphate was made by mixing equal weights of finely ground phosphate rock (the grinding would promote a faster chemical reaction by exposing more surface area) and sulfuric acid. The material was:

> mixed in cast iron pans, equipped with stirring apparatus, which rapidly mixes the rock and acid. From these pans the mixture, while still fluid, is dropped into a "hot den," where it soon solidifies. After remaining in the den from 15 to 30 minutes the reaction has usually proceeded to the point where the material can be removed with a pick and shovel or some special mechanical device. However, frequently the material is left in the den 24 hours (Anonymous 1929:124; see also Anonymous n.d. b, McKinley 2003:387-388).

It was also possible to create double superphosphate in a two-stage operation. A weak sulfuric acid was mixed with the rock to create phosphoric acid and gypsum. The latter was filtered out and discarded, while the phosphoric acid was collected and used to treat additional rock. Techniques were similar to the creation of superphosphate, except that the final product was dried in a direct-heat dryer. The resulting double superphosphate typically contained 2½ to 3 times as much available phosphoric acid as regular superphosphate (Anonymous 1929:125).

The available accounts do not clearly distinguish between the drying conducted at the mines and that which took place at the fertilizer factories, although clearly a variety of methods were being used. Memminger (1883:203) describes a process not dissimilar to kiln drying using wood, while McKinley (2003:388) reports Wando used "two large furnaces and ovens." In

addition, there was variation resulting from technological improvements and the financial abilities of the companies. For example, some fertilizer, after the acid reaction, was ground and redried, and sometimes a "disintegrater" was used instead of men with picks (McKinley 2003:393). It's likely that at least some of the technological capability of individual mills can be deduced from the number and size of steam engines and boilers that were present.

The Sanborn maps of the Ashepoo, Pacific Guano, and Stono companies show some significant similarities, and a few variations. For example, while Ashepoo and Pacific Guano relied exclusively on rail lines for both delivery of rock and shipment of fertilizer, Stono also had access to the Ashley River. All three plants hadlead acid chambers and in each case they were separated, more or less, from the rest of the processing facilities. The greatest separation was at the Ashepoo facility, where one furnace was nearly 500 feet distant – providing relief from the resulting fumes. At the other facilities the separation was not nearly so great and the extent of the technology varied, with the Stono plant having two furnaces within about 300 feet of the processing facilities.

The firms evidence from three to five boilers. While Stono apparently processed a cotton seed fertilizer, only Pacific Guano was also using fish and "scrap" in their mixes. The plans also show varying reliance on artesian and surface wells, as well as water reservoirs. Each facility had an office, as well as other support structures, such as blacksmith and carpentry buildings. In addition, all show one or more dwellings in proximity to the works.

The Sanborn maps, then, provide a glimpse of the plants, frozen in time, and offer an opportunity to compare and contrast the production features, arrangements, and housing at the individual facilities. Since at least some plants are also shown on maps for several years, it is possible to evaluate diachronic changes.

The 1874 prospectus for the Ashepoo Fertilizer Co. offers another view of what those involved in the industry found important:

> situated near the river, convenient for mining and transporting . . . . much of it has been cultivated, upon which suitable houses have been erected for tenements of laborers . . . .land in St. Andrew's Parish, S.C., at the Wapoo Cut, opposite the city of Charleston, near and convenient to the Charleston and Savannah R.R. Depot, upon which land there is a an extensive and substantial factory building, the erection of which cost $50,000, of sufficient capacity to stow at least two (2) tons of materials, besides sufficient room for working the extensive machinery, consisting of one eighty-horse-power steam engine, and three (3) large boilers in boiler house, all in good working order, four sets of French burr stone mills, . . . complete with belting, gear, &c., one new Poole & Hunt mixing machine and Poole & Hunt "smithering," with which the fertilizers are ground, mixed, screened and bagged by steam power in the most approved manner, at the rate of seventy-five tons per diem, and from eight to ten thousand tons of the best commercial fertilizers could be turned out for each selling season when required.
>
> There is excellent wharf property attached . . . having an office building and laborers' dwelling house and the premises (Anonymous 1874:5).

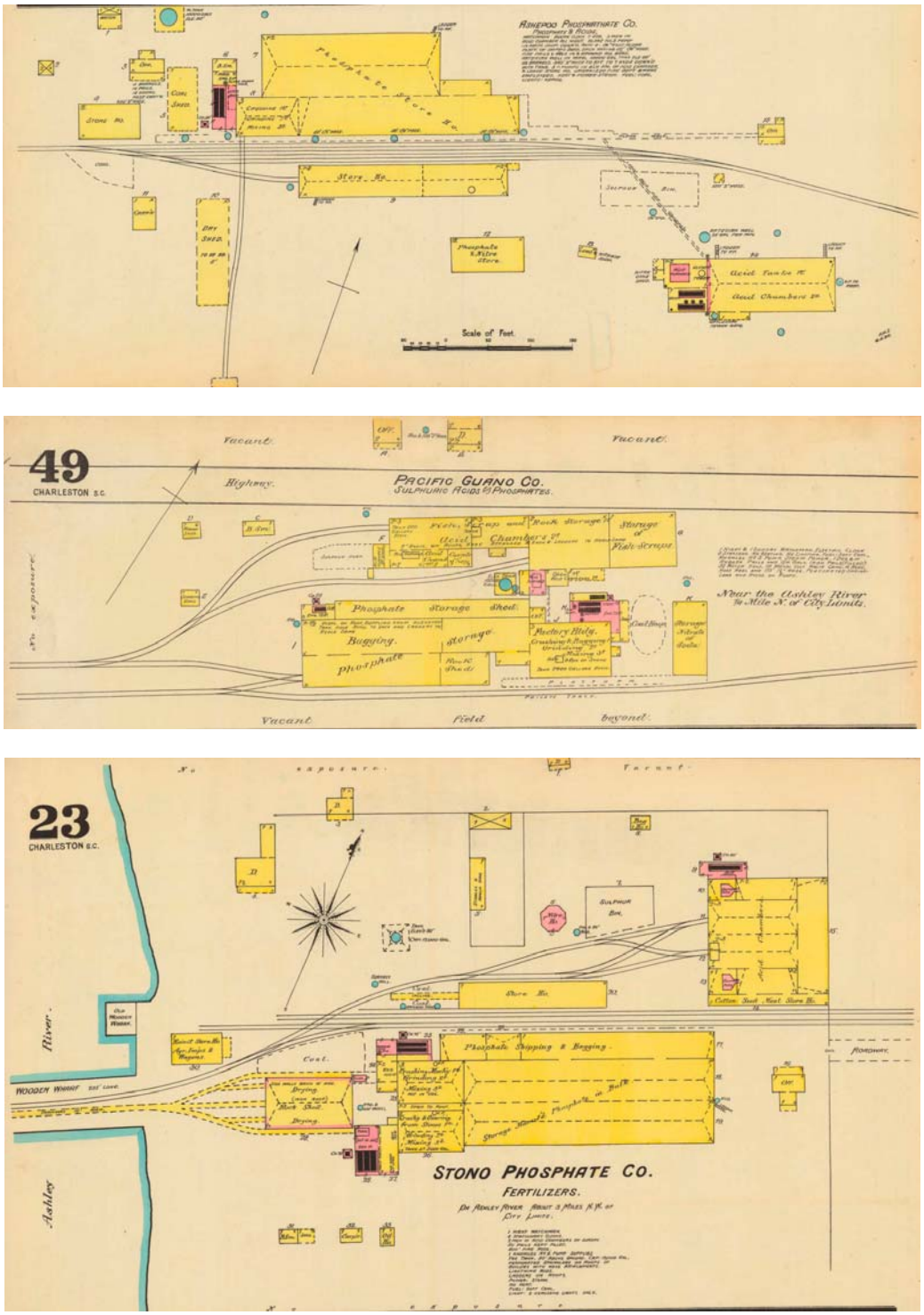


Figure 29. Sanborn Fire Insurance Maps showing the Ashepoo Phosphate Co., Pacific Guano Co., and Stono Phosphate Co. from 1888.

Obviously the setting was important in respect to the phosphate fields and transportation. Likewise, the nature of the equipment was a critical component. But the prospectus twice mentions the availability of housing for laborers – a factor already discussed in relation to the phosphate mines, and apparently also being considered important to the factories (places like the Read Fertilizer Co, later Read Phosphate, did establish a laborers' village, see Fick and Stockton 1995:60).

Memminger's description remarks that at the Sulphuric Acid and Superphosphate Company (later Etiwan) plant there were dwellings for the white supervisory workers:

> To the east of the Works, on a point commanding a most beautiful view of the harbor and sea, are four dwelling houses, in which live the families of seven of the white employees of the Company, including the Superintendent, Engineer and sulphur burners, so that at all times the property of the Company is protected by the presence of a large number of intelligent and efficient men; the roofing of the different buildings covers an acre and a half of ground, and the total horse-power of all the engines is 320 (Memminger 1873:205).

Were these dwellings necessary? Given that there were seven families occupying four houses, it is clear that the staff members in residence were expected to function as night watchmen. The beautiful view of the harbor and sea might have compensated for the industrial landscape seen from other vantage points, and sea breezes might have cleared the air. Certainly there were constant complaints regarding both the hazards of the fertilizer plants and their odors (see, for example, McKinley 2003:390, 422-425). Another account gives a compelling vision:

> All the rotten fish was brought up to Charleston until there was a big mountain of it. . . . Well, you never experienced such a terrible smell as what came from that mill. Naturally, the smell got on the people who worked there, and that made a special type of segregation. The majority of the workers in the mill were Negroes. Since the company made no provision for them to take showers or change clothes, they had to come to Charleston on the streetcar just as they were. Oh, my! The smell on those workers was so bad until the transit had to do something. They decided to put on a special car, segregating the Negroes from the mill from their own people. I wonder what they did with the whites (and including the whites who were supervisors, too), because not just the blacks working there took on the stench of that rotten fish cooking up with the chemicals. Anything nearby would stink. In fact, all Charleston stank. Although you were way down in town, sometimes you could pass out from the fumes, without knowing what was wrong. We had a joke that you could smell Charleston. Every time you came back from somewhere on the train, the fertilizer mill told you what station you were in (Fields and Fields 1983:24).

McKinley also recounts the importance of housing to the black workers (as well as the whites) involved in the fertilizer plants. He points out that as factories moved to the Neck, they were occupying a region almost as rural as the mines themselves (McKinley 2003:413).

Table 3.
Fertilizer Companies in 1882 and 1891

Company	Location	1882	1891
Ashepoo	Ashley	X	X
Ashley	Ashley	X	X
Atlantic	Ashley	X	X
Baldwin	Port Royal		X
Berkeley	Charleston		X
Bulwinkle, H.	Ashley	X	
Charleston Phosphate	Ashley	X	
Chicora	Charleston		X
Columbia	Columbia		X
Ebaugh's Marl Works		X	
Edisto	Charleston		X
Etiwan	Cooper	X	X
Globe	Columbia		X
Greenville Fertilizer Co.	Greenville		X
Hume's (or Hume Bros.) Works	Beaufort	X	
Imperial	Charleston		X
Mead	Charleston		X
Medway	Ashley	X	
Pacific	Ashley	X	
Pinckney, C.C.	Ashley	X	
Port Royal	Beaufort (Port Royal)	X	X
Royal	Charleston		X
Sea Island Chemical	Beaufort	X	
Stoney Landing Co.	Stoney's Landing	X	
Stono	Ashley	X	
Walton, Whann & Co.	Beaufort	X	
Wando	Ashley	X	X
Wilcox, Gibbes & Co.	Charleston	X	X
Woodstock Lime Co.	Woodstock, SSRR	X	

Using the 1880 census and acknowledging the same flaws for the fertilizer workers as for miners, McKinley suggests that small villages of company sponsored housing were growing up around the mills. Workers were the same average age as the miners and appear demographically stable, with nearly two-thirds of them having children and three-quarters married to wives keeping house (McKinley 2003:421). Wages were $2.50 ($44 in 2002$) a day for skilled workers and $1.00 ($17.50 in 2002$) a day for unskilled – far above what was being offered in the textile industry. McKinley also observes that as factories began to offer company housing, strikes (such as the 1873 strike among fertilizer workers in Charleston) ceased and he suggests that the workers, "surrendered working safety and independence for good wages and a roof overhead" (McKinley 2003:421).

Chazal (1904:63) notes that by 1873 there were at least six companies in the Charleston area: Atlantic, Pacific Guano, Stono, Sulphuric Acid and Superphosphate, Wappoo Mills (J.B. Sardy's) and Wando. Moses (1882:519) indicates the number had grown to at least 20, by 1888 there were 21 (Fick and Stockton 1995:55), while Watson (1907:398) reports 25 in 1907. The Inspector of Fertilizers in 1878 and 1879 list 54 and 58 companies for South Carolina respectively. While not all were manufactured in South Carolina these are likely fairly comprehensive lists and suggest the growing popularity of fertilizers. Cotton farmers used fertilizer heavily: 248,000 tons in 1899, over a million tons in 1919. Demand for fertilizer then plummeted, as the boll weevil killed the cotton industry (Fick and Stockton 1995:56).

A variety of factors affected fertilizers. At least some sense of these events can be gathered in the Stono Phosphate Co. Minutes (South Caroliniana Library). In 1882 the company's annual report explained that the drought of 1881 was a "serious impediment" to business. Collections were tardy and cash flow was restricted. Added to this several northern fertilizer factors failed and, Stono's Board complained, "their affairs placed in the hands of Assignees, who seemed anxious to realize at any price and on any terms, the stocks of their Companies; where were distributed throughout the entire cotton planting region, thus creating a

Table 4.
Fertilizer Companies list in 1907

Company	Actual Value	2002$
Ashepoo Fertilizer Co.	$149,173	$2,983,460
Combahee Fertilizer Co.	75,000	1,500,000
Etiwan Fertilizer Co.	113,400	2,268,000
Germofert Manufacturing Co.	24,000	480,000
Virginia-Carolina Chemical Co.	1,320,106	26,402,120
Atlantic Works	140,747	2,814,940
Chicora Works	290,656	5,813,120
Imperial Works	317,882	6,357,640
Standard Works	466,184	9,323,680
Stono Works	72,560	1,451,200
Wando Works	32,077	641,540

severe competition and consequent decline in prices" (1882 Annual Report, Stono Phosphate Co. Minutes, 1881-1888, South Caroliniana Library). Finally, the Board complained that the success of Charleston firms had "caused capital North, South; and West to embark in the business." The 1883 Annual Report repeated the concern with "active competition." By 1887 the Board complained that because of the "depressed condition of the trade" they discovered other companies, such as Atlantic Phosphate Co., were to begin selling their fertilizer at $10 per ton. This was the proverbial "final straw" and the company liquidated that June.

A decade later Wyatt (1891:60) lists 17 fertilizer companies and by 1907 there were five, with the Virginia-Carolina Chemical Company having absorbed a number of the earlier companies. The R.G. Dun and Co. provided a slightly different list of fertilizer factories for that same year, listing eight firms: Combahee Fertilizer Co., Etiwan Fertilizer Co., The Florida Phosphate Co., Germofert Mfg. Co., Ingleside Mining & Mfg. Co., Planters' Fertilizer & Phosphate Co., Read Phosphate Co. (a Tennessee firm), and the Virginia-Carolina Chemical Co. All of the firms had at least a good credit rating and some, such as the Virginia-Carolina Chemical Co., were given superior ratings (R. G. Dun and Company 1907).

In 1910 the *News and Courier* reported six fertilizer companies in the area: Etiwan (established in 1868, chartered in 1900, operated into the 1930s), Read Phosphate (organized in Virginia in 1874 as the Read Fertilizer Co. and reorganized as the Read Phosphate Co. in 1898, and absorbed into the Davidson Chemical Corp. of Maryland in the mid-1930s), the MacMurphy Co. (1906), Planters' Fertilizer and Phosphate Co. (1906), and the Virginia-Carolina Chemical Co. There were, in addition, five importers. With plants scattered from the Charleston Neck to St. Andrews Parish, altogether these firms were reported to employ nearly 1,400, with about 1,100 being African American (Fick and Stockton 1995:56).

Ten companies were listed by 1916: American Agricultural Chemical Co., Combahee Fertilizer Co., Etiwan Fertilizer Co., Inter-state Chemical Corp., Lambs and Chisolm Island

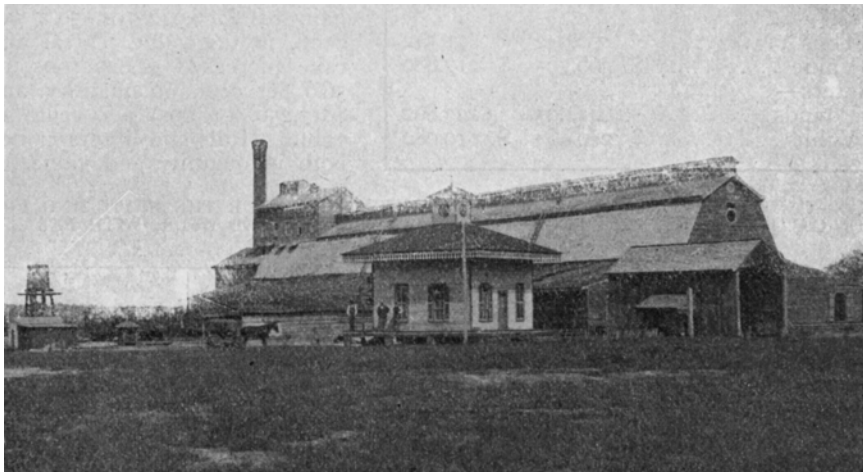


Figure 30. View of a 1907 fertilizer factory on the Charleston Neck. In the foreground is the office. In the background are the main operations, including the storage, crushing, grinding, and milling building. The smoke stack is associated with the boilers and engine house. On the far left is a water tower.

Figure 31. 1949 aerial view of Naco Fertilizer (a division of W.R. Grace).

Mines, Molony and Carter, Planters Fertilizer and Phosphate Co., The MacMurphy Co., Va.-Carolina Chemical Co., and Wulbern Fertilizer Co. These companies represented nearly 50% of the capital invested in South Carolina and produced products nearly three times the value of their nearest rival, the state's textile industry (Watson 1916: 96, 106).

The early 1900s were a time of extensive mergers and it was probably difficult to keep tract of the different companies. For example, Read Fertilizer – then Read Phosphate – sold a portion of its 70 acre property to the Coe-Mortimer Co. of New York. In 1913 Coe-Mortimer conveyed the property to American Agricultural Chemical Co., which operated the Ashepoo Fertilizer Works (Fick and Stockton 1995:60).

By 1927 some of the glory of the fertilizer industry was beginning to wear off. Although Charleston still boasted of twelve manufacturing plants and eight mixing facilities (where composite fertilizers were mixed), Charleston was usurped by Baltimore as the largest manufacturing point for commercial fertilizers in the world (Hanahan 1927:87). But two decades latter Sass (1949) still proclaimed the importance of the fertilizer industry to South Carolina and Charleston in particular. Explaining that fertilizers were a $16,000,000 a year business employing 1,200 persons, Sass listed the major firms, including American Agricultural Chemical Co., Virginia-Carolina Chemical Co., Molony Fertilizer Co., Maybank Fertilizer Corp., Naco Fertilizer Co., and the Planters Fertilizer & Phosphate Co.

It was also in 1949 that Matthews (1950:1000) announced that the Virginia-Carolina Chemical Corp. began the erection of a state-of-the-art electric furnace for producing elemental phosphorus. This new plant was being built on the site of the first phosphoric acid plant, built by Virginia-Carolina in 1907. The phosphate rock for the facility was not to be from South Carolina, but would be hauled by train from the company's Florida fields.

Left unsaid was the continuing environmental deterioration caused by these firms. Beyond the foul smelling guano and fish scraps, or the acrid smell of burning sulfur or even sulfuric acid, was the gradual contamination of the soil with arsenic and lead, as well as the leaching of phosphorus into the waterways – resulting in the exploding shrimp reported by the *Charleston Post and Courier* ("Legacy of Contamination Still Haunts Rivers, Creeks, *Charleston Post and Courier*, February 24, 1998, pg. A7). McKinley (2003:452) summarizes at least some of the damage. It lingers on today, with at least seven fertilizer plants recognized by the EPA as significant sources of pollution, including Ashepoo Phosphate (discharging to

the Ashley River), Atlantic Phosphate Works (plume discharging to the Ashley River), Carolina Eastern-Malony Fertilizer (being monitored), W.R. Grace & Co. (plume being discharged to a tributary of Shipyard Creek at one of two locations), Stono Phosphate (plume discharging to the Ashley River), and Swift Agri-Chem (plume discharging to the Ashley River).

The Economic Impact and the Industry's Demise

There is no question that phosphates brought great wealth to the state. For those who sold their land, the prices of $6 to $20 an acre were well above to the pre-phosphate values of $2 an acre (see McKinley 2003:110, 116). The News and Courier (1884:54) reported a uniform six-fold increase in land values. The sale price was probably even more attractive in light of the aggressive tax program of the Radical Republican legislature. For many who invested in phosphate companies the returns were good. Even the ill-fated Stono Phosphate Co. was paying dividends of $15 a share. The *New York Times* reported that phosphates were bringing a 25% profit ("South Carolina's Prosperity – What White Labor Has Accomplished in Recent Years," *New York Times*, February 4, 1884). And for those who worked at the mines the wages, while pitiful, were still far above what could be earned as a farm laborer. Although not a topic of this study, if the royalties paid by the river mining companies were considered, then the value of phosphates to the state treasury would also be clear (accounting for 20% of the state's income according to the News and Courier 1884:54).

Rowland, as early as 1883, explained that the profitability of land mining was based on six critical features: the location of the deposit with reference to the transportation network, the difficulty of extracting the rock (i.e., its depth, drainage, presence of trees, and so forth), the quality of the rock, the extent and yield of the deposit, the supply of necessary raw materials (labor, water, and wood, for example), and the facilities for removing the rock (probably the ability to capitalize the equipment necessary) (Rowland 1883:1007). While he did not attempt to develop costs, we are fortunate that several other individuals did.

In 1886, as part of their internal discussions surrounding their financial future, Stono Phosphate calculated production costs per ton of fertilizer (Stono Phosphate Co. Minutes, 1881-1888, South Caroliniana Library). Although not strictly mining costs, these are still useful for evaluating the profit margin of the industry at the time. They found that each ton of superphosphate cost them $11.69 ($225 in 2002$). Of this total, the ingredients were $6.61 ($127 in 2002$), the bags were $1.08 ($21 in 2002$), with the rest ($4 or $77 in 2002$) being labor and salaries. They compared their costs of $4 per ton to those of Edisto Phosphate, where the costs were only $2.50 per ton (it appears they assumed that ingredient costs would be about equal). While interesting, this fails to provide information on the actual cost of phosphate mining – except to suggest that in the mid-1880s production costs were between $6 and $7 per ton.

Table 5.
Phosphate mining costs per ton in 1886 and 1891

1891		1913	
Mining, max 15'	$1.00	Mining, labor	$1.50
Draining	.50	Washing, labor	.10
Loading, carrying to washer	.60	Drying, labor	.05
Washing	.30	Haulage	.30
Drying	.50	Fuel for power plant	.04
Shipping via water	.25	Fuel for drying	.12
Interest and repairs	.15	Interest	.40
Supervision and management	.20	Insurance	.05
Towage to Charleston	.25	Taxes	.05
		Overhead	.10
		Depreciation	.75
Total	$3.50	Total	$3.46

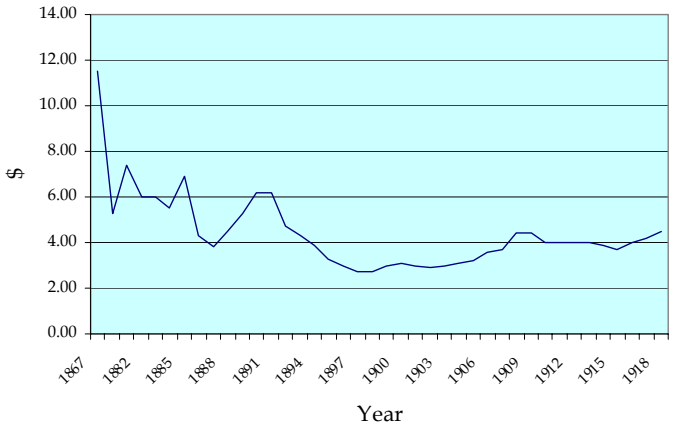


Figure 32. Prices for South Carolina phosphate rock (from Shick and Doyle 1985:19).

Wyatt (1891:60) provides a more detailed account from 1891. He found that each ton cost about $3.50 ($69 in 2002$). A very similar figure of $3.46 ($63 in 20024) is reported by Waggaman (1913) about a decade later.

These have little meaning, however, without comparing them to the price of phosphates. Fortunately Shick and Doyle (1985:19) provide these prices, which are shown in Figures 32 and 33 (as period prices and with the prices converted to 2002$). In 1886 rock was selling for about $4.30, while production costs were at least $6.00 – reflecting a loss of $1.70 per ton or a loss of around 40%. By 1891 phosphate was selling for $6.20 and production costs had declined to $3.50 – netting a profit of about 77%. In 1913, with phosphates selling for $4.00 a ton, the production costs were $3.46 – allowing a return of only .54¢ or 16%.

When prices were good, phosphates appear to have been profitable. When prices dropped, however, phosphates – like rice and cotton before them – were a significant economic drain. Using $3.50 as a standard cost of production, it is clear that from 1895 to 1905 phosphates were selling at below the production cost and that both before and after this period there were occasional years when the profit margin would have been very slim – perhaps only a few cents per ton. Given the investment, the return would likely not have been worth the risk. The "heyday" of phosphates, then, was relatively brief, from 1867 to about 1891 – a little over two decades.

With the 1890 discovery of phosphates in Florida, South Carolina reacted with amazing speed, sending E.L. Roche, the special phosphate assistant, to investigate conditions in Florida. He reported that "while with our deep water facilities for placing the product in the markets of the world and prestige of an already established trade, there need be no fear of immediate detriment to our phosphate interest, yet the Florida rock is bound in the near future to become an important factor in the market and the sooner this is recognized, the better will we be able to prepare for the competition when it comes" (Mappus 1938:52-53). One wonders whether South Carolina learned from his guarded advice. The *New York Times* reported that while the previous year's discoveries in Florida, "temporarily injured the

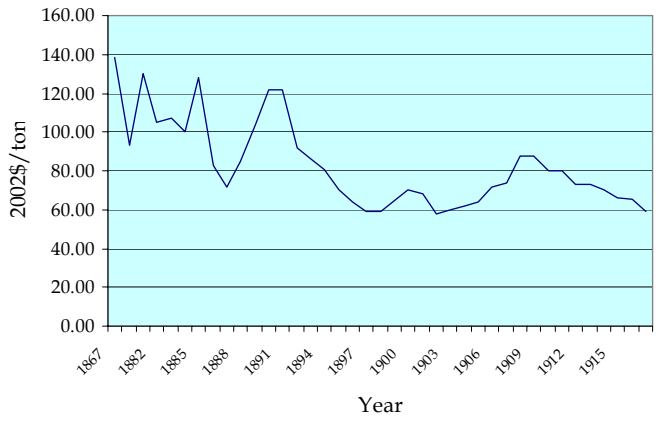


Figure 33. Prices in 2002$for South Carolina phosphate rock (from Shick and Doyle 1985:19).

industry" in South Carolina, the final result was to stimulate yet additional development in 1890 – with an additional $1,000,000 of capital pumped into the South Carolina mines. The justification was apparently that the "demand for commercial fertilizers is constantly growing" ("Mining Phosphate Rock," *New York Times*, January 29, 1891). In retrospect Chazal criticized at least some of this additional investment by the Charleston Mining and Manufacturing Co.:

> new management was . . . composed of men ignorant of the phosphate business, and who . . . were equally unfamiliar with its lessons and results. Carried away by wild opinions as to the dangers threatened to the value of their property – through of its real value, indeed, they could have had but a hazy idea – by the recent Florida development and disregarding the advice of the experienced and skillful management which had been in successful conduct of the business of the company for so many years, they thought they had found a panacea for their anticipated troubles in a cheapening of the cost of production by the abandonment of their old plant at Lamb's, and the erection of a new, larger and more costly one on the Fetteressa plantation at Bee's Ferry (Chazal 1904:61-62).

On the heels of the Florida discovery South Carolina's new government, Ben Tillman, took a careful look at the phosphate industry (or at least that part regulated by the state – the river rock mining permits). This was not his first expression of interest – in the late 1880s, he had leveled charges of corruption at the state-chartered monopoly on phosphate mining. As governor he proclaimed, "if we are to permit capital to shirk taxation and corporations to dictate to the State in order to have money come here for investment, we don't want it" (quoted in Kantrowitz 2000:186). Although this demagoguery may have supported his populist appeal, the years that the river rock was tied up in court dramatically hurt the industry.

While it might be expected that Tillman's Coosaw litigation would have driven river rock interests into land rock mines, it did not, because Florida rock was being found vastly superior. It contained 70% bone phosphate of lime, yielding a superphosphate containing 18% soluble phosphoric acid. In contrast, South Carolina, with 58% bone phosphate of lime, produced a superphosphate with only 14% soluble phosphoric acid (Mappus 1938:63). The Florida rock was also significantly lower in contaminants such as iron and alumina than even South Carolina's land rock (Rogers 1915:215).

The Florida rock was also of a pebble variety – allowing it to be mined hydraulically and allowing easier processing. The cost of mining Florida rock was, at the high end, about $2.50 per ton, compared to costs of $3.50 to as much as $4.70 per ton for South Carolina rock. In addition, Florida's royalty was more than 50% lower than South Carolina's (Mappus 1938:57).

So, while only 10,000 tons of Florida rock was shipped between 1888 and 1890, up to June 1891, 110,000 tons were shipped to Europe alone – more than all the South Carolina rock shipped in any one year. Although mining had only just begun in Florida, 18 companies began almost immediately and were operating with a capacity of 867,000 tons per year.

Rogers (1915:215) observes that despite the advantages of Florida rock, South Carolina phosphate tended to grind better, react more thoroughly with sulfuric acid, and produce a finer fertilizer than the phosphate from Florida.

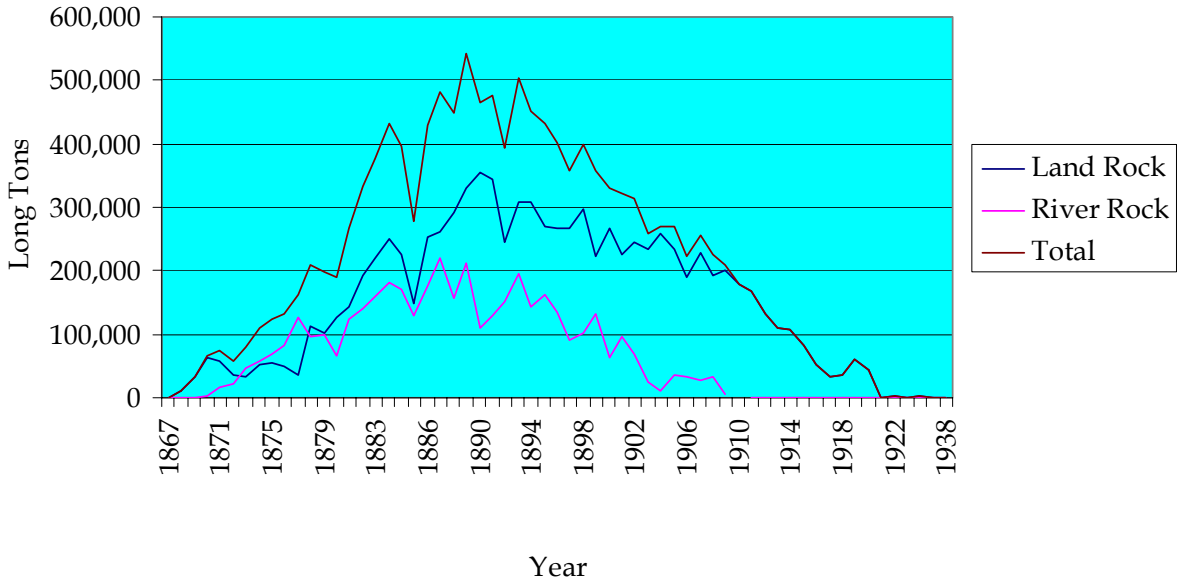


Figure 34. Production of South Carolina phosphate rock.

Although Rogers notes that these characteristics "have aided the South Carolina product in competition with the higher-grade Florida rock" they were not adequate to save the South Carolina industry.

Prior to the fields in Florida opening, Mappus (1938:58) reported that the demand for phosphates was just equal to supply. With Florida flooding the market, the price fell dramatically, to levels where South Carolina was unable to produce its lower grade rock and see any profit.

Many authors consider that the 1893 hurricane dealt a death blow to South Carolina's phosphate kingdom (see, for example, Fraser 1989:327, who observes, "the machinery and facilities of the phosphate mining operations were damaged so extensively by the hurricane that some companies never fully recovered"). It seems reasonable to counter that the region suffered extreme hurricanes in August 1885 and August 1893, followed by a major hurricane later in October 1893 (Mathews et al. 1980:55). The 1893 hurricanes, however, coincided with the onset of a general economic depression, which worsened the financial turbulence experienced by South Carolina's railroads, most of which were being absorbed by out-of-state trusts indifferent to the possibilities of Charleston as a rail or port terminus (Doyle 1990:172-173). More reasonable assessments come from authors such as Waggaman (1913:1) who attribute the decline in South Carolina phosphates, very simply, "to the marketing of higher-grade phosphate from other sources."

By 1910 there were only four land mining companies still operating: Charleston Mining and Manufacturing Co., C.C. Pinckney, Bolton Mines, and Bulow Mines. Together they employed less than 1,200 men (Fick and Stockton 1995:56).

With some regret Hanahan (1927:85-86) announced in 1927 that South Carolina was

producing no phosphate (production for all intents and purposes ceased in 1920) and that the 200,000 tons being used was all shipped from Florida. A decade earlier Rogers had commented that the higher-grade Florida rock could be delivered to the Charleston harbor "at a price only slightly above that of the local product" (Rogers 1915:220).

Although certainly requiring more capital, phosphates might be placed in the classification of what Coclanis described as "rudimentary extraction and plunder – the stuff of Marxian primitive accumulation" (Coclanis 1989:58). The parallels to rice (and indigo, cotton, and lumbering) cannot be overlooked. Among historians the big issue seems to be whether phosphates brought any significant, long-term change. Shick and Doyle argue that phosphates represent a "stillbirth of the New South," a "harmless flurry that left the area, its economy, and its hierarchy of class and race, still within the mold of the Old South" (Shick and Doyle 1985:4). Charleston, they claim, reached the twentieth century "untouched" by new ideas and still clinging to old, conservative ideas and economic stagnation. They even claim that the failure of the phosphate industry can at least partially be laid at the feet of the African American community, which resisted the "wage labor market."

The issue of wage labor and the African American response was convincingly dealt with by Philip Morgan (1982) several years prior to Shick and Doyle's (1985) article. African Americans were focused on their needs and issues – not those of a largely white industry looking for cheap labor. African Americans, after years of slavery, sought to establish independence from whites and white society. They chose not to accept the Protestant work ethic and adopt to the expectations of white society, but to diversity their own means of subsistence and survival, ensuring economic and social autonomy.

In spite of this obvious flaw in Shick and Doyle's thesis, many researchers continue to support their "stillbirth" theory. Fletcher and his colleagues (Fletcher et al 2003:58), for example, find the thesis "aptly" describing the "tragic ending to a promising beginning."

More recently McKinley (2003:466-470) has reviewed Shick and Doyle's conclusions, finding several of them to be flawed. He points out, for example, that far from being apathetic and inactive, Charleston's leaders such as Memminger, Trenholm, and Adger were all aggressively pursuing phosphates. He suggests that comparing Charleston to Atlanta distorts the reality of a less successful, but still energetic city. Most importantly, McKinley disputes that the phosphate industry left no lasting economic impression, pointing to the sustained fertilizer development that continued to dominate Charleston for the next 60 years. Certainly there can be no dispute that a lasting legacy of phosphates are the sites in Charleston so badly polluted that they deserve superfund status. Nor can the extraordinary destruction of the landscape caused by what was essentially strip mining be ignored. For the two to three decades of profitable production, South Carolina has paid a terrible toll.

It is still to be decided if the demise of South Carolina's phosphate industry really can be ascribed – as McKinley suggests – to a "combination of bad politics, bad luck, and bad weather" (McKinley 2003:468). Why did river rock interests not turn to land mining? Was it "just" bad luck that South Carolina business community was overwhelmed by over production, cheaper rock, and higher grade phosphates in Florida? Can a natural event that occurred several times during the history of phosphates really have caused its collapse? Should we place greater importance on the general depression of the 1890s? Might historians be able to examine indigo, rice, cotton, lumber, phosphate – and come to some more substantive conclusion concerning the roads that

South Carolina has taken and the choices that have been made?

Research Questions

Historic contexts are intended to link properties – such as archaeological sites – to important historic trends. The National Register observes that a context refers "to all of those historic circumstances and factors from which the property emerged." By understanding the context we can better understand the importance of the resources being evaluated and we are more likely to accurately understand the property's role in history (Sherfy and Luce 1998).

One way – perhaps the most important way – for a context to achieve these goals is for it to clearly focus on the important questions that a particular type of site might address. That is the goal of this final section. Having provided a broad overview of land rock phosphate mining in South Carolina, it is appropriate to now look at the research questions the archaeological remains of phosphate mining (including the fertilizer factories) may address.

At least one historic context (Fletcher et al. 2003) for evaluating phosphates is available to the researcher. Within the examination of the Ashley Phosphate Co. and Bulwinkle Works, Fletcher and his colleagues suggest several research topics, all largely historical. Their conclusions are indefinite: "archaeologically, the value of phosphate and fertilizer production facility sites is not yet known" (Fletcher et al. 2003:114). However, some of their archival findings, particularly the graphics and maps, do suggest potentially fruitful areas for field work as well as further research. For example, the image (Fletcher et al. 2003:48; also shown here as Figure 20) shows a laborer cooking over a wood fire, apparently using metal vessels. This reminds us of the historical accounts suggesting that the laborers often prepared their meals in the mines. The plan of a "typical fertilizer operation" and the 1902 Sanborn map of the Ashley Phosphate Company plant (Fletcher et al. 2003: 33, 65; as well as similar figures in this study) clearly depict dwellings – begging for additional research and archaeological study.

An earlier report, examining a portion of the Bradley processing facilities at Rantowles Creek (Sipes and Hendrix 2002), identifies the barge landing associated with the property being studied here (although it does not identify the washer or other structures known to exist based on historic accounts and at least one twentieth century map). A nearby domestic site is mentioned as "possibly associated with a logging company that leased the property" (Sipes and Hendrix 2002:60). Little investigation of the site was conducted, and it was not determined whether it was associated with the McLeod Lumber Company's post-1943 activities on the site, with the phosphate operations, or perhaps some other use of the land.

The Bradley holdings, historically many thousands of acres, are now in several ownerships. Sipes and Hendrix studied approximately 125 acres, most or all of which was formerly part of Long Savannah Plantation, a 3300-acre tract that was incorporated into the Bradley holdings. The 3,053 acre "Campbell Tract" included in fieldwork for this study is a separate portion of Long Savannah Plantation.

It is important to counter the common argument that historical research can more quickly, conveniently, and forcefully address the majority of phosphate-related topics. For example, given the level of detail provided by the 1880 and 1890 census records, could we not reconstruct the lifeways of African American phosphate workers using these published materials? As McKinley – an historian himself – observes, "due to the inadequacies of the census and the nature of the work and businesses, the phosphate and fertilizer industries were virtually invisible in the historical record, but extremely important to South Carolina's economy" (McKinley 2003:4). He notes that this "invisibility" is identical to that attributed to the

lumber industry by historian Gavin Wright (1986:156-165). Both were extractive industries with temporary bases, dominated by black workers who chose to maintain a low profile to the ruling white class. As a result, many of the topics in this context will be difficult – perhaps impossible – to examine using primary historical documents, but may be approached using archaeological investigations.

African American Laborers

Who were the African Americans that labored in South Carolina's phosphate mines? McKinley provides us with the suggestion that contrary to the common perception they were "not trapped in the exploitative postwar agricultural labor system," but were actually forging their own place under their own terms. While not discounting the social and legal limitations that African Americans faced, he is also unwilling to classify them as either powerless or victims. He notes that historic evidence exists of a:

> quiet economy – including fishing, hunting, an internal economy, and temporary jobs – that enabled black families and workers to survive alongside – and only occasionally within – the inhospitable white economy. Phosphate miners, and to a lesser extent fertilizer workers, passed like shadows across the historical scene, partly because they did not want to be detected (McKinley 2003:10-11).

He goes on to observe that oppression breeds what he terms a "world of hidden lives, not just isolated acts" and he urges historians to "pry open that concealed world."

Can archaeology document this "quiet economy?" Does this lifeway leave behind a recognizable archaeological pattern – distinct from that of slavery or those African Americans more strongly devoted to agrarian pursuits? And most fundamentally, shouldn't archaeologists also be attempting to "pry open" the "concealed world" of the phosphate miners and fertilizer factory workers? Consequently, the most fundamental category of research is a focus on the lifeways of the phosphate workers – especially the African Americans. Issues of the "quiet economy," so intimately associated with subsistence, should be suitable for archaeological inquiry, especially if the research designs are not preoccupied with block stripping, but are willing to emphasize careful hand excavation. It may also be necessary to examine non-traditional areas, such as the immediately adjacent swamps or mine pits, looking for refuse from the structures.

Research questions might profitably include:

1. identification of assemblages and patterns thought to be associated with mine or factory workers for comparison and contrast to those from slavery and agricultural tenancy;
2. efforts to identify evidence of ethic differences, realizing that the phosphate mines employed not only African Americans, but also Germans, Italians, and Polish workers;
3. study of those areas where convicts were known to be housed to compare and contrast the lifeways of independent workers with those contracted out by the state;
4. documentation of worker's cabins as part of an effort to determine the nature of construction and distinguish between the "shanties" and more substantial housing – as well as to compare and contrast phosphate or fertilizer housing with that found in slavery;
5. efforts to identify and distinguish "group" housing – known from the 1870 census from individual or family housing (an interesting comparison might be the Union efforts to establish

barrack housing for contraband during the Civil War); and
6. research to document activities specific to the mines, including such divergent topics as ownership/possession of tools, use of a commissary, and heavy drinking or gambling that might support the "rowdiness" said to be typical of the camps.

The Complexity of the Mines

Although it is tempting to look at mines only from the perspective of either industrial processing or domestic settlements, such a view oversimplifies at least some operations. These sites also had offices, hospitals, commissaries, and other structures. Research questions might:

1. consider the full range of structures likely present on mine or factory sites, and attempt to both identify and collect adequate assemblages to begin formulating artifact patterns for the various structures;
2. explore the specific structures while taking into consideration the domestic structures (for example, where a hospital is present do the domestic sites exhibit a lower than anticipated quantity of patent medicines?);
3. examine the spatial layout or patterning of the mines and fertilizer plants to determine what level of functional or administrative clustering might be present; and
4. look for the economic, technological, or social stability of the 1870s and 1880s, being replaced by evidence of instability during the 1890s as the industry became more depressed and efforts were made to control costs.

Industrial Archaeology

While industrial archaeology is a vibrant and exciting field in some states, the discipline seems never to have matured in South Carolina (perhaps because of the state's preoccupation with agrarian pursuits, rural sites, and especially plantation archaeology). As a result, there seems to have been little attention on the variety of worthwhile research topics that phosphate mining and fertilizer production opens.

Admittedly, many industrial sites offer challenges to conventional archaeological research. They are often of a relatively transient nature – phosphate production, for example, lasted only about 50 years. Some have seen continuous activity that has changed the site – but the change may be no greater than is often seen at urban sites, where archaeologists have learned that "disturbance" is part of the archaeological record. The sites may also have left toxic deposits – these should not dissuade research or be used as excuses for not fully investigating sites. Finally, some authors have excused inadequate research on the pollution and danger of these sites. Yet in other areas of the United States archaeologists have had no problem complying with health and safety mandates and still investigating industrial sites (see, for example, Hamilton and Stratton 2001 and Hamilton et al. 2000).

There are significant research issues that might be addressed at phosphate mines and processing centers, including:

1. variability and change in mining technology and how these issues may be seen in the archaeological record;
2. the impact of mining technology – and its change – on the workplace and the workers;
3. the spatial organization of the mines and fertilizer factories;
4. the relative uncertainty of technological activities at the mines (in contrast to the far better documented activities at fertilizer factories);
5. creation of adequate inventories of mine processing facilities and fertilizer

factories, including documentation at the level of HABS/HAER;
6. how the extant vestiges of the mining or fertilization facilities relate to the broader technological development of the locality and region;
7. a broader understanding of the individuals associated with the particular facilities and their impact on the state; and
8. how the mining or fertilizer production activities are reflected in the archaeological record.

Certainly additional research topics will be devised as work progresses, but we should begin to focus more attention on this component of South Carolina's history. The mines, processing plants, and fertilizer facilities represent very finite resources and the mines and their processing plants have already been significantly impacted as development spreads west toward Red Top, southwest toward Johns Island and northward into Berkeley County from Charleston. Similarly, as superfund cleanup continues preceding development on the Charleston Neck it is likely that the fertilizer plants themselves will be dramatically transformed, with the resulting loss of critical archaeological data.

Archaeologists and historians should renew interest and focus on this overlooked aspect of South Carolina's transition from the "old" to the "new" South.

THE HISTORY OF THE BULOW TRACT

Sarah Fick

The Early History

The early history of the section of St. Andrews Parish between the Ashley and Stono rivers involves several prominent South Carolina names, among them Drayton, Cattell, Stanyarne, Middleton, Bull, and Fuller.

The project tract, 3053 acres, comprises most of the 3300-acre Long Savannah Plantation assembled between 1823 and 1833 by John Joachim Bulow from six adjoining parcels. Bulow's plantation took its name from his first purchase, the 1632-acre Long Savannah Plantation, his largest and best-documented acquisition in the area.

Long Savannah was owned by Charles Drayton (1743-1820) at his death, and in accordance with his will (Charleston County Will Book 34, p. 344-346), it was sold in 1823. The land had come to Charles Drayton through his father John (d. 1779). John Drayton purchased the land on which he built Drayton Hall in 1738, and from that time at least through the mid-1770s, he actively acquired more land in St. Andrews Parish. In 1774 he bought his father's Magnolia Plantation from his nephew William Drayton of Florida. More important to this study, in 1777 John Drayton and his neighbor William Cattell agreed on the boundary line between two tracts they owned on the north branch of the Stono River. They drew the line along the center of a dam that ran into "public drain," allotting the 400 acres north of the line to Drayton (Charleston County RMC, DB L9, p. 230).

We have not found records of John Drayton's acquisitions of the other tracts that became Savannah Plantation. Notes he made between 1775 and 1777 on blank pages of his copy of Wells's Register and Almanack show that operated not only Drayton Hall but also several other named tracts: Gordon's, Mount Pleasant, Southard, Savannah, Bear Swamp, and Bob Savannah. He did not record activities at Magnolia, which would be inherited by his son Thomas (1758-1825).

Charles Drayton kept diaries of his personal and planting activities for decades. These diaries are in the archives of Drayton Hall (a property of the National Trust for Historic Preservation) but were not consulted for this study). Griffin (1985) refers to them as being filed at Historic Charleston Foundation, but the original Drayton documents that were held by the foundation have been returned to Drayton Hall. She also cites them as being on microfilm at the South Carolina Historical Society, but the society does not have the diaries or any record that they were ever deposited there.

The "Gordon's" tract is mentioned only once in the Wells notes, in November 1775 when John Drayton inventoried the cattle there: 57 head dry cattle, including seven bulls, and 13 calves. Gordon's was a parcel of 200 acres "very good for corn and rice" that Drayton had purchased from the executors of John Gordon in 1762, paying £1950 current money. Gordon had been a planter in 1747 when he bought the land from Benjamin Stanyarne, but at his death ca. 1761, he was a tavern keeper in Charleston. On his plantation near Ashley River were "about 70 head of neat cattle, 30 head of horses, mares and colts, some household furniture, several carts, plantation tools and implements"

(advertisement in *South-Carolina Gazette*, various dates, February 1762).

Gordon's did not become part of Long Savannah, but was passed to John Drayton's younger son Thomas. Bob Savannah was sold in 1793. Based on the tract names, we believe that the Bear Swamp and Savannah tracts became part of Charles Drayton's Long Savannah. Information about John Drayton's Mt. Pleasant and Southard tracts is also provided here - they might have been incorporated into Long Savannah as well.

In November 1775 (Wells notes), John Drayton sent 68 sheep to the Bear Swamp field, and counted 411 cattle on three tracts, Savannah (223), Gordon's (70), and Drayton Hall (118). At the Savannah, where a Mr. King was overseer, his slave Ned counted the fowl: 25 geese, 21 turkeys, and 32 chickens.

There are terse references to the overseers in the Wells notes. In December 1775, the unnamed overseer at Bear Swamp sprained his leg. John Burns, overseer at Mt. Pleasant, "ran away" in June 1776, returning a month later. During the same time, five slaves were lost from Drayton's workforce to labor on public works (probably roads or bridges). He was compensated at 10 shillings each per day.

In December 1775, Drayton sent horses to forage or pasture on his plantations, noting them by name and/or description. Eleven went to Mt. Pleasant, including a pair of carriage horses and two mares in foal. To Southard went 17 horses, four of them being mares with colts alongside. A two-year old bay filly was noted as "came of Charles' horse." Drayton does not inventory the horses at Drayton Hall, but during the summer of 1776, rough rice was delivered from Savanna to feed them. Savanna and Bear Swamp had each produced about 50 barrels of rice in 1775. In October 1776, Drayton recorded that year's corn production at four tracts: 62 barrels (each holding 41 bushels) at Savanna, 47 at Drayton Hall, 69 at Bob Savanna, and 163 at Mt. Pleasant.

In the spring of 1776, Drayton distributed corn: two barrels for seed at Savannah in March, and one and a half barrels "for the people" at Savannah in April. For the next several months, he gave out rations of corn at Savanna, Bear Swamp, and Mt. Pleasant on a periodic basis, figuring each time how long the corn would last, e. g. "17 days say to the 22 July." In July he gave out corn for both places, and the 22 hands of Mt. Pleasant. On August 7 he brought 51 bushels of corn from Savannah to Drayton Hall, and four days later gave out seven barrels at Savannah for that place and Bear Swamp. Then at both Drayton Hall and Mt. Pleasant from August 7 to September 9, the "people been eating small rice" [unmarketable broken grains]. In October, Drayton gave out corn again, recording quantities allocated to slaves, the Mt. Pleasant overseer (one barrel new corn), and poultry (one barrel old corn). Slaves were mostly given old corn too - this appears to have been the previous year's stored crop.

The Revolutionary War impacted the Drayton properties heavily. As on other plantations outside Charleston, its livestock and crops were frequently commandeered by troops operating in the area. John Drayton died in 1779, and in 1780 his son Charles left the Continental Army and returned to planting.

Charles Drayton only took up residence in his father's home when his stepmother Rebecca Drayton died in 1784. He immediately began planting provision crops at Drayton Hall, continuing to manage Savanna/Bear Swamp for rice and cotton, livestock and corn. There were overseers at both, but Drayton was an active planter himself and visited each plantation almost weekly. Like all plantation owners, he found managing overseers to be difficult. In 1807 he hired T. G. Zwickel to oversee Savanna, contracting to pay him $40 yearly and to provide two milk cows, 300 pounds of meat, and a household slave. The cash wages were also to

be supplemented with coffee and sugar. Zwickel lasted only two months before the slaves forced his departure (Griffin 1985:364-365).

The inventory of Charles Drayton's personal estate at "the Savanna plantation and at Drayton Hall" was made by his son and executor, Dr. Charles Drayton (Charleston County Inventory Book F, p. 246). At Drayton Hall were 42 slaves, 6 oxen, 19 head stock cattle, 70 sheep, a pair of carriage horses, a corn mill, and 128 bushels of corn. The list of household furnishings is extensive. At Savanna were 68 slaves, 14 oxen, 63 head stock cattle, 23 hogs, two sheep, and five horses. The crops on hand included 732 bushels of corn, 25 bushels of peas, 40 bushels of oats, eight bags of cotton, a 40-saw gin, a lot of plantation tools, and an ox cart. No household goods were included - anything in the overseers' residences must have belonged to them, not to Drayton.

In February 1823, two years after Charles Drayton's death, Savanna or Long Savannah Plantation was sold at auction. With the high bid of $8,800 ($151,725 in 2002$), John J. Bulow acquired his first property in St. Andrews Parish (discussed below).

Bulow's Long Savannah, 1823-1872

Called the Campbell Tract after a late-20th century owner, the subject property is a tract of 3053 acres: 1643 upland, 1328 wetland, and 82 acres of marsh. The tract makes up most of the 3300-acre Long Savannah Plantation sold by the estate of John Joachim Bulow to Charles O. Witte in 1862 (a 125-acre portion of Long Savannah, now in separate ownership, is discussed in Hendrix et al. 1992).

Joachim Bulow was a Charleston merchant who died in 1795. In his will (Charleston County Will Book 25, pp. 318-322) he made legacies to his wife, his daughter Ann Elizabeth Bulow (who later married Robert Geddes of St. Andrews Parish), and sons Charles Wilhelm Bulow and John Joachim Bulow. He directed that all his real estate, "consisting of a number of plantations or tracts of land in the hill and low country of this state" was to be sold at private sale by the executors.

Charles Wilhelm Bulow died ca. 1823. After legacies to his wife and daughter (Charleston County Will Book 36, pp. 871-875), he directed the rest and residue to be sold for the benefit of his son John Joachim Bulow, who was then a minor. He further devised to his son "the lands which I have recently purchased in East Florida." John J. Bulow, Jr., who had been named for his uncle, moved to Florida where he died in 1836 (*Charleston Observer*, May 21, 1836).

We did not find records in the Charleston County Register of Mesne Conveyance of any sales of land outside the city of Charleston by Joachim or Charles W. Bulow or their estates.

Joachim Bulow's namesake son, John Joachim Bulow, married Caroline Amelia Lehre. Like J. J. Bulow's brother-in-law Robert Geddes, his wife was connected to several St. Andrews Parish families: Caroline was the daughter of Col. Thomas Lehre and Susannah Scott, who had been the widow of James Stanyarne (d. ca. 1780). There were two children, Caroline and Thomas Lehre Bulow.

Caroline Amelia Bulow died in 1827 (*Charleston Observer*, October 27, 1827) and both Bulow children were underage when John Joachim Bulow died ca. 1841 (his will was written January 17, 1840 and was proved June 30, 1841; Charleston County Will Book 42, pp. 293-302). He provided for his daughter by leaving an annuity to Miss Jane Stanyarne, with whom she would live during her minority, then to Caroline a lifetime interest in 13 lots in Charleston, most of them with houses, and a house on Sullivans Island. To his nephew Charles Bulow Geddes he left a lifetime interest in "the plantation in St. Andrews Parish which I purchased from Est. James Ladson" (this tract

later became part of J. J. Bulow's residual estate, possessed by his son Thomas L. Bulow).

John Joachim Bulow's will bequeathed to his son Thomas Lehre Bulow, then to Thomas' children, "all my plantation in St. Andrews Parish called Savannah, and several adjacent tracts, total 3031 acres; also all the slaves and other personal estate on or belonging to the plantation." Thomas would also receive his father's town house, two additional parcels in Charleston, and land in Greenville and Spartanburg districts.

Bulow had assembled his "Savannah" plantation from six adjoining parcels between 1823 and 1833. The land lay generally northeast of Rantowles Creek, then called the North Branch of Stono River, and was bisected by Bear Swamp Road. Bulow's first acquisition of land in St. Andrews Parish was the Drayton family's Long Savanna tract.

Dr. Charles Drayton (1743-1820) of Drayton Hall left his home plantation to his son, also Charles Drayton, and directed that his lands at Coosawhatchie, a portion of Jehossee Island, and "my plantation called Savannah" were to be sold, the proceeds to pay his debts and provide legacies to his three daughters (Charleston County Will Book 34, p. 344-346).

Accordingly, in 1823, the plantation called Savannah in Drayton's will was advertised for sale at auction as "Long Savannah." The notice (*Charleston Courier* beginning December 17, 1822) describes "That well-known plantation called Long Savannah, on the Bear Swamp Road, situated near the head of the Eastern Branch of Stono River, and not two miles from Rantowle's Bridge, and about 10 or 12 miles from Charleston, by the way of the New Bridge and Turnpike Road."

John Joachim Bulow was the high bidder for the property, and paid $8,800 ($151,725 in 2002$) ($5.39/acre; $93.00 in 2002$) for the plantation, described in the deed (Charleston County RMC DB L9, p. 233) as "Plantation in St. Andrews Parish, Charleston District, as surveyed by Henry Ravenel 1820 as 1632 acres in all: 1147 high, 360 swamp land, 75 rush land, and 50 of wooded _ land. Said tract being on the Bear Swamp Road and called Long Savannah. Butting and bounding on lands belonging to B. D. Roper, C. Rowand, B. Elliott and _ Danner." We did not locate the surveyor's plat referenced in the deed, but from other transactions can determine that the Rowand tract was to Drayton's west, separating Long Savannah from Rantowles Creek proper.

Just a year after his purchase of Long Savannah, in February 1824 Bulow acquired another parcel adjoining it. For $1000 ($18,520 in 2002$) ($6.53/acre or $121 in 2002$), the Charleston District Commissioner in Equity conveyed to him 153 acres, "bounding north on Est. Mrs. Sarah Fraser deceased, east on Bear Swamp Road, south on late Dr. Charles Drayton deceased, west on same and also on John Dener/Danner." This sale had been requested in order to partition a tract among members of the Wigfall family, its heirs (Charleston County RMC DB P9, p. 33). No description of the property was provided except its bounds.

In 1828 John J. Bulow made an important acquisition, paying neighboring planter Charles Elliott Rowand $200 ($3,774 in 2002$) (Charleston County RMC DB U9, p. 403; Figure 35) for a four-acre portion of Rowand's Poplar Grove Plantation. The parcel on Hog Island (McCrady Plats 6532) had a landing on Rantowles Creek, providing Long Savannah with direct access to the Stono River. Its value to Bulow is evident in the sale price, $50/acre ($943 in 2002$).

Also in 1828 Bulow acquired a larger parcel adjoining Long Savannah, paying $600 ($11,320 in 2002$) ($3.03/acre or $57 in 2002$) for a 198-acre plantation that was part of lands formerly owned by the late Francis Ladson, Sr., and by the late Mrs. Sarah Fraser. This parcel was described as "bounding north on lands now

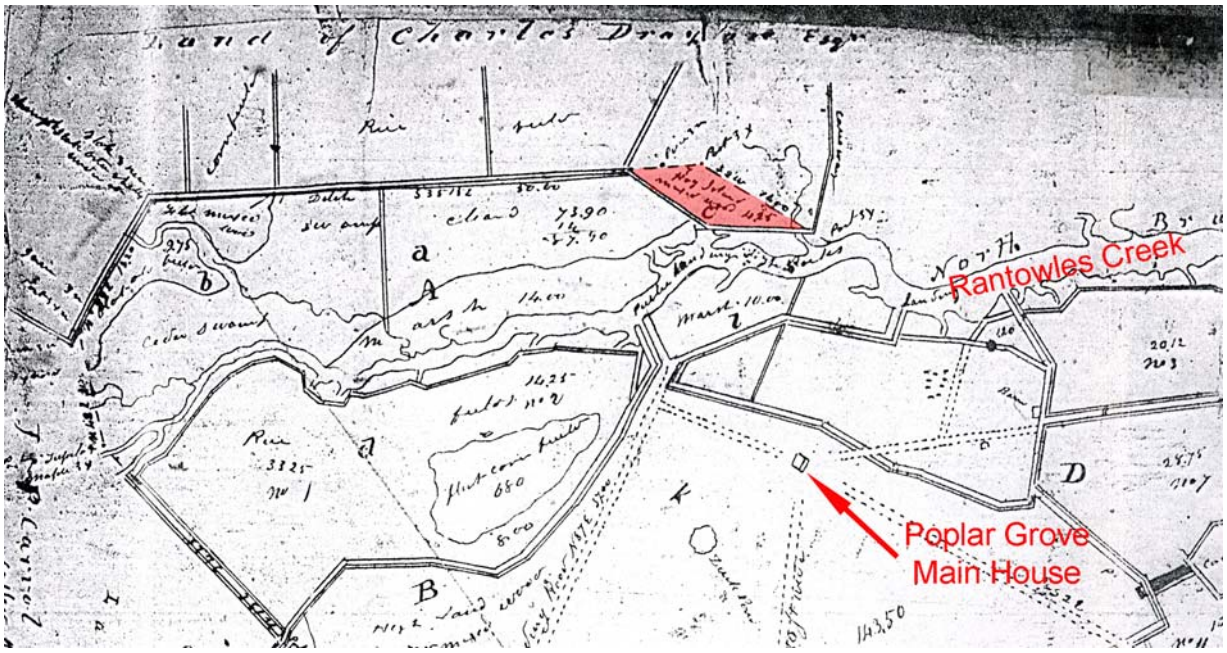


Figure 35. Plat showing Hog Island highlighted (McCrady Plat6532; see also Charleston County RMC DB U9, p. 403).

or formerly of Nathaniel Fuller and Capt. Ladson, west late of John Drayton deceased, south now or late of Mr. Bampfield and Est. Joseph Williams, east on said Bampfield and on the Broad Road (Charleston County RMC DB X9, p. 366).

A few years later, John Joachim Bulow completed assembling his Long Savannah plantation with two purchases of land on the east side of Bear Swamp Road. In January 1832 he paid James Ladson $1,005 ($20,937 in 2002$) ($1.07/acre or $22.30 in 2002$) for a 935-acre tract "bounding northeast and northwest on Thomas Fuller, west on _ Baker, south on Thomas Wigfall, southeast on Thomas Drayton." The tract had been advertised as a plantation "about 14 miles from town, known as the Cottage Tract, containing about 999 acres, bounded on the east by lands of Thomas Drayton, west by Thomas Fuller, south by Thomas Wigfall, Esq., being about a mile from Ashley River on a landing. This tract is remarkably well wooded, and adapted to the culture of cotton, corn and rice. There are about 200 acres cleared" (*Charleston Courier* beginning January 17, 1832). Ladson had owned the land only since 1826, having bought it on behalf of himself and his sister Helena C. Cattell from the estate of their father James H. Ladson (Charleston County RMC DB C10, p. 232).

Bulow's final acquisition was in December 1833, when he paid James Stuart, a Beaufort planter, $500 ($10,638 in 2002$) ($1.32/acre or $28.10 in 2002$) for a 378-acre plantation "bounding south on Baker, west on the Bear Swamp Road, east on Est. James Ladson, and north on formerly Thomas Fuller, now of Pringle" (Charleston County RMC DB G10, p. 58: Figure 36).

By the time John Joachim Bulow began acquiring land in St. Andrews Parish, the area was already falling out of favor with planters eager to grow rice in tidal fields, or Sea Island cotton on higher ground. In 1816, Edisto Island planter Thomas B. Seabrook had paid $10,000 ($128,205 in 2002$) ($12.45/acre or $160 in 2002$) for Wappoo Plantation [later Milne] on the Stono River between Wallace and Rantowles creeks (Charleston County RMC DB N8, p. 65).

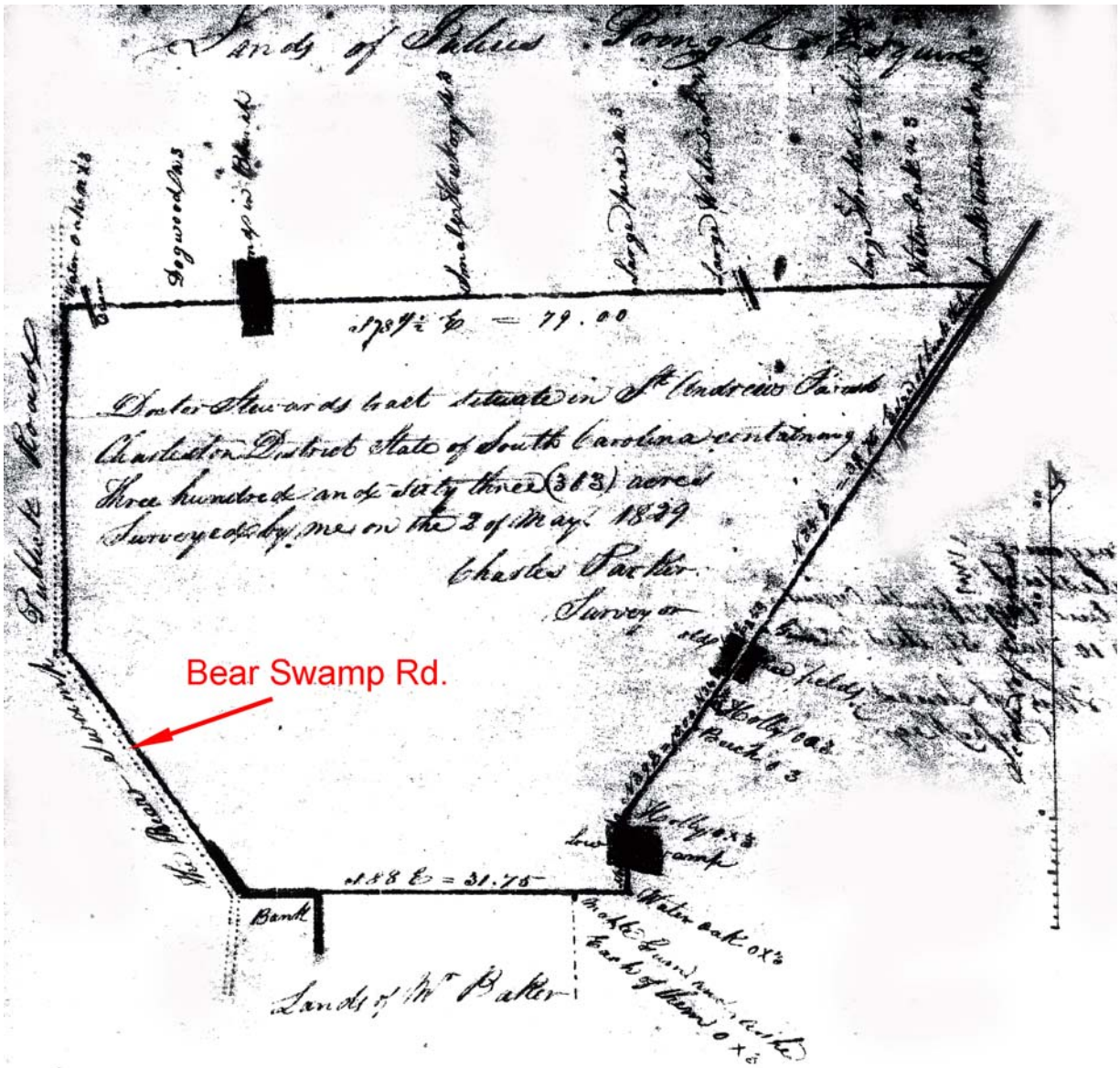


Figure 36. Property east of Bear Swamp Road acquired by Bulow in 1833 (Charleston County RMC, DB G10, p. 58).

This became primarily a cotton plantation, while the Rowand's Poplar Grove remained in rice cultivation.

Devised by Thomas Elliott (d. 1760) to his daughter Mary, who married Robert Rowand (Stockton n.d.), Poplar Grove was well described when advertised for sale:

> That valuable rice plantation, well known as Poplar Grove, belonging to the Estate of Charles Elliott Rowand, situate 12 miles from Charleston and 2 from Rantowles Bridge, 848 acres of which about 280 are rice land of the first quality, and in a high state of cultivation, and about 115 acres prime rice land,

unimproved. The buildings are all in complete order, consisting of a Cog Rice Mill, worked by animal power, capable of pounding 400 barrels of rice, without interfering with the plantation work. Also a Cog Cotton and Corn Mill. The dwelling house is of brick, containing 9 rooms, with double piazzas, and commanding a pleasant and extensive view, with every necessary and convenient Out Building, including stables for 25 horses, with Carriage and cart houses complete. The grounds near are neatly laid out. The whole is under good fence, and most of it enclosed by a fine and luxuriant hedge of Nondescript [sic] Rose. There is also a large kitchen and flower garden near the dwelling, containing choice fruit trees. From its proximity to the city, it combines all the advantages of a valuable farm, as well as a plantation. The property is too well-known to need a more particular description, having been the residence and property of one of the best and most successful rice planters in the state. It is said never to have failed in a crop, having all the advantages of tide water, with reservoir, which have always been abundant. The rice produced has always commanded the best market price, and has often been sold for seed of the best quality. The provision crops have always been abundant affording more than a full supply for the plantation, and of the best quality. The crop of the present year is now on the place and can be seen by anyone disposed to purchase (*Charleston Courier* beginning January 1839).

The description, while thorough, leaves questions. For example, in spite of the rice mill and 280 acres of rice lands, why were an additional 115 acres of "prime" rice lands not be cultivated? Why is there a cotton mill (probably a gin), yet no indication that cotton was being planted? These may indicate that by 1839 the property was in decline.

Compared to sales in other parts of the Lowcountry during the 1820s and 1830s, Bulow's land, ranging in price from $1.07/acre to $6.53/acre, was inexpensive indeed. For example, on Edisto Island in 1835, Ravenwood Plantation, 300 acres, was sold for $60/acre (Charleston County RMC DB I10, p. 256, P10, p. 483), and in 1839 William G. Baynard paid $62/acre for two tracts totaling 482 acres (Charleston County RMC DB W10, p. 494).

On Johns Island, Benjamin Dart Roper bought several plantations between 1824 and 1837. He paid $30/acre for Rush's Plantation, 388 acres, in 1824 (Charleston County RMC DB P9, p. 69); $21.21/acre for Hickory Hill's 330 acres in 1830 (Charleston County RMC DB Y9, p. 455); and $17.79/acre for the 967-acre Brick House Plantation in 1837 (Charleston County RMC DB Q10, p. 90).

Prices on St. Helena Island, too, were significantly higher than along Rantowles Creek. In 1826 Edgar Fripp paid Perry Fripp $18.56/acre for a 192-acre St. Helena plantation (Charleston County RMC, DB U9, p. 280). In 1836 Thomas C. Vanderhorst sold Woodlands Plantation, 610 acres, for $20/acre (Charleston County RMC, DB L10, p. 322), and the 580-acre Broughton Plantation for $15/acre (Charleston County RMC, DB L10, p. 446). In 1845 Thomas Fuller Sr. sold 350 acres of Orange Grove Plantation for $17.14/acre (Beaufort County RMC, DB 17, p. 601).

While we have not found the specifics about the land or conveyances, we know that before his 1841 death, J. J. Bulow had acquired two tracts in St. George's, Winyah, Parish, and these rice plantations and their slaves probably provided much more income to the Bulows than did Long Savannah.

Long Savannah was left to Thomas L. Bulow in trust, because he was under 21 when his father wrote his will and died. T. L. Bulow had reached the age of 21 by October 1843, when he qualified as an executor of his father's will. In 1845, Thomas L. Bulow "of St. Andrews Parish" married Martha Caroline Ball, the only daughter of the late Alwyn Ball of St. Johns, Berkeley, Parish (*Charleston Observer*, March 16, 1845). Martha Caroline's mother Mrs. Esther Ball, had married Edward Gamage of Charleston in 1843 (Holcomb 2004: 190).

Although the index to the 1850 Population Census for Charleston District does not include the Bulow family, the Agricultural Census reported Thomas Bulow with 3,351 acres (2000 improved) in St. Andrews Parish. He kept four horses, eight mules, 60 milk cow, 35 other cattle, and 50 sheep. The Slave Schedules show him in possession of 153 slaves, 51 of them under 15 (including six under a year old). No rice or cotton production was reported for 1849, which is probably an error in the census record. Of 17 other planters on the same sheet as Bulow, only three reported growing these crops. However, the census did report Bulow's other crops: 50 bushels of peas and beans, and 1,000 bushels sweet potatoes.

Thomas L. Bulow owned and presumably occupied his father's Charleston town house, and also had a residence on Long Savannah plantation (shown on Johnson's 1865 map; outside the boundaries of the project tract). He and his wife Martha Caroline had two sons, Thomas Lionel (born 9/26/1845) and John Charles (born 6/1/1847). For reasons unknown to us, the Bulow marriage had fallen apart by 1854. On January 24, 1855, they filed a Separation Agreement (Charleston County RMC DB P13, p. 527). They had "mutually agreed to live separate and apart and to dissolve the marriage contract between them so far as by law they can do." Mrs. Bulow was given custody of their sons, who would visit their father's home weekly. As each became 12 years old, she would "quietly and peaceably deliver them up to Thomas L. Bulow."

Under the separation agreement, T. L. Bulow would provide well for his wife and children. After placing in her hands the inheritance ($16,607 in bank stock and three slaves; $345,979 in 2002$) she had received from her father's estate, he gave a bond to pay her $2500 ($52,083 in 2002$) yearly in semi-annual payments. Martha Caroline Bulow had no further claim on her husband or his estate, and agreed that the suit she had brought in Equity Court would be discontinued, the bill to be destroyed. His sworn answer was also to be destroyed. Two men witnessed to Martha Caroline Bulow's signature on the agreement: Henry C. King, and powerful attorney Robert Barnwell Rhett. Thomas Bulow's signature was witnessed by his uncle Thomas Lehre and magistrate C. A. DeSaussure.

A separation agreement was as close as it was possible to come to divorce in nineteenth century South Carolina. We have encountered very few such agreements, and cannot speculate about what the terms of this document might suggest about the cause of the separation. We are also uncertain what effect Bulow's personal troubles had on his economic activities. Between 1844 and 1860, Thomas L. Bulow (and his estate) sold 17 town lots, gave mortgages on 13, and bought two others. Much of this town property had come to him on the death of his sister, who was married to Ephraim Mikell Seabrook but had no children.

Before his elder son had reached twelve years old, Thomas Lehre Bulow, aged 35, died of gastritis on July 14, 1857 (Charleston County Public Library Death Cards). His will was

probated just four days later (Charleston County Will Book 48, pp. 119-121). He left his plate and silver to his sons, then placed the rest of his estate in trust for them.

An inventory of Thomas L. Bulow's personal property in Charleston District was taken in August 1857 (Charleston County Inventories, Book E, p. 285). In the city were 19 slaves, all the goods associated with a well-furnished town house, and some items infrequently included in inventories: a hip bath, a small bath tub, a pair of revolvers and one of pistols, four guns and three gun cases, a life preserver and two velocipedes (early bicycles). Like these, the stable equipment suggests that Bulow supplied his sons lavishly. He had a four-seat buggy and double harness and a two-seat buggy and single harness, but kept only an inexpensive carriage donkey in town. On the other hand, there were a pair of ponies (valued at $80 or $1,667 in 2002$), two single ponies ($50 and $25; $1,042 and $1,562 in 2002$), a double pony harness, two riding bridles, two saddles (one of them new), and a boy's saddle. Most of the household goods, and the ponies, were sold before November. The slaves were gradually sold, some of them as late as April 1959.

The August 1857 inventory also lists Bulow's real estate, without estimating its value. There was a Santee River rice plantation in Prince George's Winyah Parish, the city lots and houses previously the property of his sister, three other town lots with two houses, and land in St. Andrews Parish. Although T. L. Bulow had held most of Long Savannah in trust, he owned outright the Ladson parcel which had been left to his cousin Charles Geddes for life, and a separate tract that he had purchased from the state's escheator (we did not find this deed; this tract might account for Bulow's having reported 3,351 acres to the 1850 census, instead of the 3,331 that his father had owned).

Most interesting to us is the list of slaves and goods still at Bulow's plantation in St. Andrews Parish in November 1857. There were only five slaves, several "old field ponies," and several fine horses: a five-year old black stallion, two mare and four colts, one of them a yearling with "blood improved by crossing." Two other horses were still on the plantation, but several more had already been sold by the estate: four bay ponies, a black buggy horse ($250 or $5,208 in 2002$), a crippled horse named Bright, two mares, two stallions, and a small jackass. A small lot of hogs had also been sold, as had most of the 1857 crop: fifty acres of cotton, one hundred acres of rice, and surplus corn (1856 crop). The country house had furniture and a library, and the unsold furniture from the town house had been retained "for the use of the house in the country." Finally, there were two deer "in the park" at the country house, valued at $12 ($250 in 2002$).

Bulow's executors petitioned to be allowed to sell his plantation in 1859, but it was not offered for auction until June 1862 (Charleston County RMC DB P14, p. 357). During the intervening years, production dwindled. By 1860 the Bulow Estate in St. Andrews Parish had only 25 slaves, six of them children, but 30 slave houses. The 1860 Agricultural Census reports the estate of J. J. Bulow with 3,331 acres, only 400 improved. There were two mules, four milk cows, and five swine. The 1859 production was given as 700 bushels corn, 400 bushels sweet potatoes, 25 bales cotton, and 64,000 pounds rice (a large crop for the area compared to nearby operators Patrick O'Neil with 75,000 pounds; T. D. Grimke with 33,000 pounds; A. H. Brisbane with 20,000; J. G. Drayton with 13,000; William J. Bull with 3,200; and J. H. Wilkes with 3,130 pounds).

The 1860 census shows Thomas Bulow's widow, aged 30, her two sons, and her mother Mrs. Gamage living in the household of the noted artist Charles Fraser (1792-1860). We have not explored relationships, if any, among the Ball, Bulow, and Fraser families.

The sale of Long Savannah took place in early June, 1862. The Civil War was underway,

but there was still hope that the South would win. Particularly because planters had been forced to evacuate the Sea Islands, inland tracts would still find a market. The advertisement offered for sale at auction:

> all that valuable plantation, with the buildings thereon, in St. Andrew's Parish, belonging to the estate of J. Joachim Bulow, and known as "Long Savannah," containing 3300 acres more or less, of which about 200 acres are rice land, and 500 acres are cleared high land. . . . A part of this land is under lease to the 1st of January next. The sale will be made subject to the lease (*Charleston Courier* beginning May 28, 1862).

Charles O. Witte, a banker, was the high bidder for the tract, at $7,150 -- probably Confederate dollars, but the deed does not specify this. It was described as the "3300-acre plantation known as Long Savannah, bounding north on (late) Elliott tract, south on lands of Verdier and Hughes, east on Bear Swamp, west by T. O. Lowndes. As per 1/1860 plat by John L. Branch" (Charleston County RMC DB P14, p. 357). We did not find this plat.

William Bradley's Long Savannah

The study tract takes its name from Margaret Rhett Cuthbert Campbell. In 1948, her grandfather, C. P. Cuthbert of Charleston, paid $30,340 ($226,418 in 2002$) ($10/acre or $75 in 2002$) to Bradley Realty Corporation of Massachusetts for the "3034-acre parcel known as part of the Bulow Tract, butting and bounding north on Millbrook and Runnymede, east on Magnolia and Oakland, south on Oakland and part of Bulow Tract, Millbrook, and the center of a canal that is the dividing line between Bulow and Millbrook" (Charleston County RMC DB M49, p. 4; PB G, p. 53).

Bradley Realty Company was organized by Peter B. Bradley and Robert S. Bradley of Massachusetts. Their father, William L. Bradley, was a New England manufacturer and one of the most important outside entrepreneurs in South Carolina's early phosphate industry. Besides his land rock operations, he was a major shareholder (with 16.4% of the initial shares) in the River & Marine Mining and Manufacturing Co., second only to state Senator Daniel T. Corbin, who authored the original legislation under which the firm was organized and owned 17.6% of the stock. George W. Williams & Co. owned 11.2%. By 1875 Bradley owned 540 shares - more than Williams and Corbin combined (Edward Willis Scrapbook, 1843-1877, South Caroliniana Library).

William Lambert Bradley (1826-1894) was born in Cheshire, Connecticut. When he was only 13, he began his business career as a clerk with a New Haven dry goods store. Later he became a traveling salesman for a brass and iron foundry owned by Charles Parker (Gunther et al. 1997). Eventually Bradley became interested in the manufacture of clocks and small metal wares. He began business with his brother Nathaniel L. Bradley and Walter Hubbard, their firm evolving into Bradley and Hubbard Manufacturing Co., one of the largest producers of kerosene lamps and items such as andirons, match-safes, desk sets and clocks during the late nineteenth to mid-twentieth century (Stamm 1993). The company was eventually purchased by the Charles Parker Co. (Gillespie and Munson 1906:418-419).

In 1861 Bradley entered into the fertilizer business with Oakes Ames of Boston. Ames was involved with his family's shovel factory in Easton, Massachusetts, and took an active interest in railroads. Their initial fertilizer factory was in Boston, but soon larger quarters were necessary and the plant moved to North Weymouth. It eventually became the largest fertilizer factory in the world.

Figure 37. Portrait of William Bradley (Gillespie and Munson 1906).

As early as 1870 William Bradley, with capital of $500,000, was mining phosphate deposits at "Eight Mile Pump, on Northeastern Railroad" on property leased to Otto Moses (who later worked for the U.S. Geological Survey and wrote on South Carolina phosphates). The work on this property was apparently supplying the phosphate for Carolina Fertilizer, a company owned by George W. Williams & Co. (Holmes 1870:84; see also Anonymous n.d. a). Williams was a noted Charleston factor, banker, and fertilizer tycoon, who also pushed through the legislation to grant the Marine and River Phosphate Mining and Manufacturing Company of South Carolina what amounted to exclusive rights to mine river rock (see McKinley 2003:317-318). He was also a supporter of William Bradley, giving him a mortgage of $10,000 secured by the 3300-acre plantation known as Long Savannah (Charleston County RMC DB H17, p. 193).

In 1872, Bradley Fertilizer Company was incorporated in Massachusetts. Branch offices were established in Rochester, NY; Cleveland, OH; Baltimore, MD; and Augusta, GA. The company's main office remained at Weymouth Neck, along the Fore and Back Rivers. A huge processing, storage, and shipping facility was located at what became known as Bradley's Wharf (portions of the plant site are now the William Webb State [Massachusetts] Park).

William L. Bradley was president and manager of Bradley Fertilizer (Gillespie and Munson 1906:419). Although Gillespie and Munson (1906:422) suggest that he retired early, turning the business over to his two sons, W. L. Bradley maintained an office at his factory as late as 1890, listing his occupation as "fertilizer" (Sampson, Murdock and Co. 1890).

Bradley acquired Long Savannah in the late 1860s through a transaction with Henry Knight. Knight had agreed to purchase the tract from Charleston businessman Charles O. Witte in 1867. Although he paid $1,500 of the $20,000 purchase price and took possession of the land,

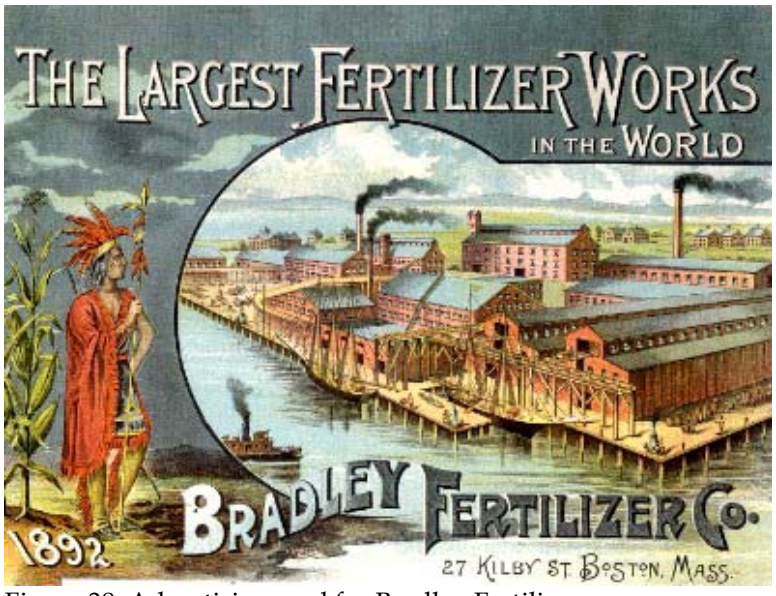


Figure 38. Advertising card for Bradley Fertilizer.

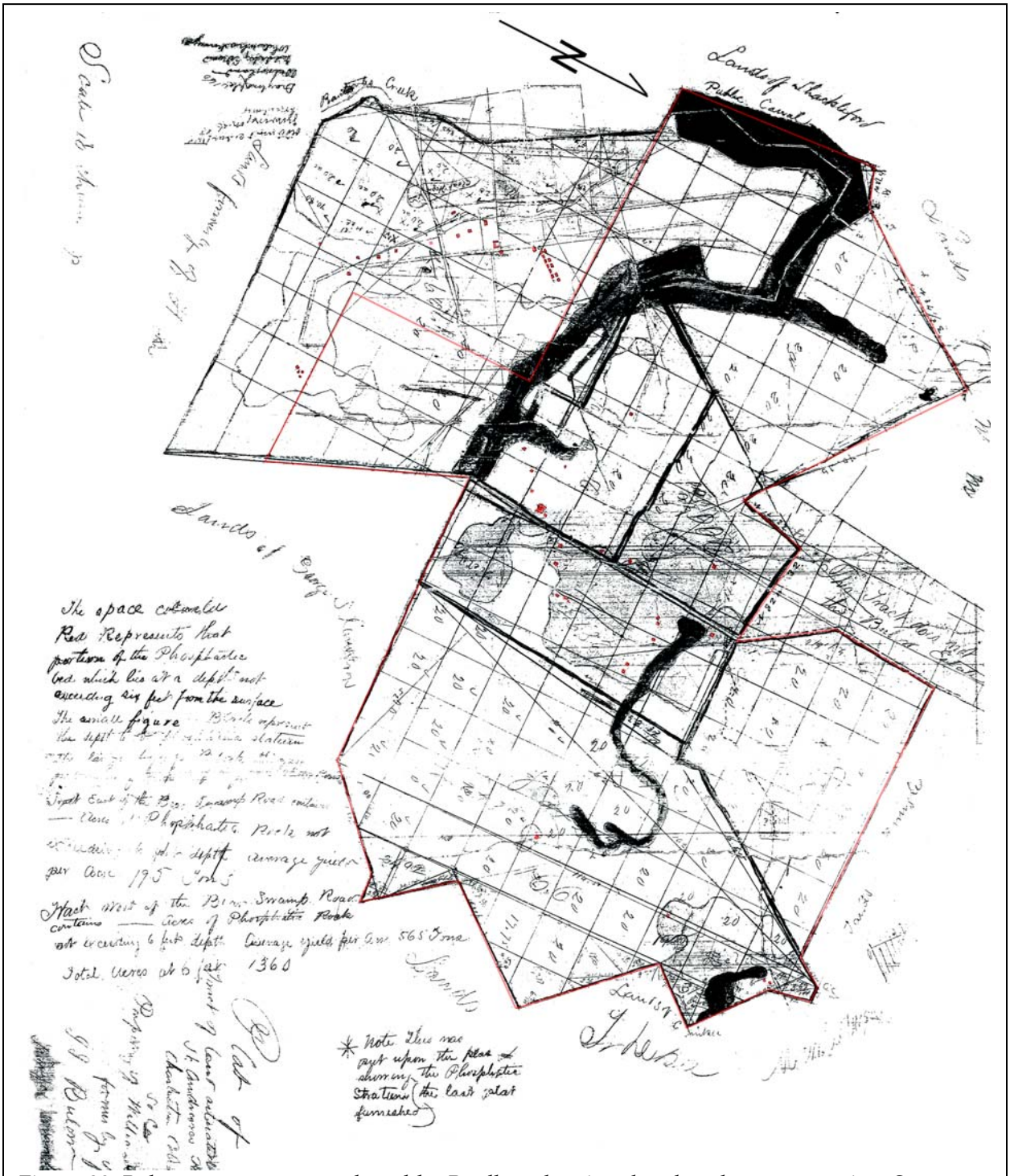


Figure 39. Bulow property as purchased by Bradley, showing the phosphate prospecting. Structures shown on the March 1872 plat are highlighted; margin notes suggest the plat was based on an earlier Charles Drayton plat (McCrady Plat 1160).

he did not complete the contract with Witte. He nevertheless conveyed the property to William L. Bradley, who was in possession by January 1870. Bradley began exploring the 3,300-acre tract for phosphates (Charleston County RMC DB K16, p. 347), took a quitclaim from Knight in November 1871 (Charleston County RMC DB W15, p. 81), and in a separate agreement the following year, gained clear title from Charles O. Witte in exchange for $25,003.28 (Charleston County RMC DB F16, p. 40). This was Bradley's first acquisition in St. Andrews Parish, where his Bulow Mines became one of the principal operations.

The Bulow Mining Operations

The most thorough account of the Bulow Mine comes from the *News and Courier* article, "There's Millions In It" (March 1, 1884). This reports that the mine, owned by Bradley, was superintended by Mr. Z. E. Sawtelle under the direction of William Cox. Like Sawtelle, this individual eluded the late nineteenth century census reports. He might be the Cox who was identified in 1880 census as a 35 year old banker who was originally from Philadelphia, Pennsylvania and was boarding in Charleston. Cox was not listed in 1900. (However, he conveyed two tracts adjoining Bulow to W. L. Bradley in 1888 and 1889: a five-acre tract with buildings on the Bear Swamp Road, "being No. 23 in a plan of the Greenwich or Huger Plantation," and a 166-acre tract of marsh land on the western boundary of the Greenwich tract, formerly commonly known as the "Hughes Plantation," per plat of "Greenwich Tract" or "Optimus C. Hughes Plantation" recorded in Land Commission, PB _, page 11, in the Office of the Secretary of State at Columbia, Charleston County RMC DB L32, p. 158).

According to the *News and Courier*, the Bulow place but had been surveyed for phosphates by C.U. Shepard, Jr., the likely author of the plat showing the tract in 1872. Of the approximately 4,000 acres of property, 3,000 are classified as phosphate land, with the remainder "old field" land. The article indicates that the mining was begun in 1870, although it was not being regularly worked until 1883.

The Bulow rock was reported to be in a zone about 18 inches in thickness, typically at a depth of about 4 feet, and embedded in clays that were easily washed. Following industry standards, the pits at Bulow were hand dug, 6 feet wide and 15 feet long, with each producing about 1 ton of rock. The company was mining only about 40 acres a year and at the time of the article, only 150 acres had been mined. In 1883 the mine produced 30,000 tons, with most shipped either to Bradley's factories, to England, or to Charleston.

The article reports that the rock was from 58 to 60% phosphate of lime. Chazal (1904:11) reports an analysis of Bulow rock made by Dr. W.D. Warner, assistant to Professor Charles U. Shepard, Jr., perhaps reflecting Shepard's early survey of the mines. It is reproduced here as Table ?, and shows over 27% phosphoric acid - equivalent 59.44 per cent bone phosphate of lime - consistent with the newspaper article.

As a result of poor drainage and its maximum elevation of only 8 feet, the mining field was well ditched, "the smaller ditches all leading into a main ditch from which the water is pumped by an 8-horse power steam pump. Each field is banked to keep the outside water out, and in this way the pits are kept as dry as possible, although the miners have to work a great deal in water and mud."

We are told that there are 350 hands "at work" at Bulow, although this number almost certainly varied. Most of these hands were African Americans, although in 1884 there were also 40 Italians working the fields. There were an additional 10 hands at the washer, and "in other special work 35 hands."

The *News and Courier* mentions that the miners are "all furnished with houses on the

Table 6.
Analysis of Bulow Rock (Chazal 1904:11)

	%
Moisture	2.43
Organic matter and water of combination	5.68
(1) Phosphoric acid	27.23
Sulphuric acid	1.45
Carbonic acid	3.05
Lime	39.10
Magnesia	traces
Oxide of Iron	1.38
Alumina	0.40
Silicious (insoluble) matter	13.03
Fluorine, chlorine, and other ingred., undetermined	5.25
	100.00

place," although only 150 families were living at Bulow year-round. The article also reports that, "Many of the miners put up rude shelters composed of piles thatched with sticks and mud on the rock fields, and live there until the hot weather begins, when they hunt for healthier homes" - making it unclear whether these "rude shelters" were an alternative to the company supplied houses, or whether only certain workers were provided with residences. Bradley also provided each family with "as much land as they can take care of." This must have been an attempt to retain mine workers, but there is no indication whether it was successful.

Moving from the mine field to the processing facilities, the article reports that Bradley had four screw washers, although only two were worked, the others being held in reserve. Supplied with water by a 20-hp steam pump, the washers had a capacity of 100 tons a day and were operated by a second 80-hp engine. Rock was transported from the field to the washers by 4-miles of rail lines using 30-pound rail. Bradley equipped his mine with two locomotives (each able to pull 20 loaded cars) and 120 bottom dumper cars. Upon reaching the washers, phosphate rock was hoisted up an inclined plane. Unlike many of his competitors, Bradley did not kiln dry his rock, but instead shipped most wet. Only a small amount was sun dried, probably on large drying tables (although the article does not specify). The rock was either stored on the mill wharf (capable of holding 5,000 tons) or loaded on board lighters and shipped to Bradley's Cannonboro wharf on the Ashley River, near the old Charleston and Savannah Railroad Wharf, where up to 10,000 tons could be stored.

In addition to the washer, drying sheds or floors, wharf, and rail lines, the administrative facilities would have included an office. There was also a general store and, at some point, a hospital ("3 Bulow Mines Buildings Burn - Woods Fire Quickly Spreads Through Oaks on Estate West of the City," *News and Courier*, February 28, 1943, pg. 10).

The 1884 newspaper report was complimentary of Bradley's business, being "conducted with great system":

> An accurate account of each day's doings by each man employed in the mine and checks are issued, which are paid off on Saturday of each week. Due bills are given for "field labor," "general labor," "washer," and "one pit," which are dated and numbered, and are made "not transferable." At the end of each day an itemized statement is sent to Mr. Bradley, showing the tons of wet and dry rock washed and shipped, the expense of washing, the general expenses, including railroad repairs, &c., the number of pits finished and their cost, the number of miners, the field expenses, &c., including every item of expense. All these items are made out for each day of the week, and in this way the owner in Boston knows almost as much about his business as his agent at Bulew [sic].

Wyatt (1891:55) identified Bradley's Bulow Mines as capitalized at $250,000 - second only to

Figure 40. Bulow tokens (from http://www.angelfire.com/sc2/tokenofthemonth002/).

Charleston Mining and Manufacturing, with its $1,000,000 capital - perhaps explaining the careful conduct of the work.

Besides issuing daily chits to his laborers for redemption at the end of the week, Bradley prepared 10¢, 25¢, and 50¢ copper tokens, all dated 1879 and marked "Bulow Store/Wm. L. Bradley" on one side and "This Check NOT Transferable" on the reverse. Apparently an identical set were also minted lacking the words, "This Check," and were probably struck later (although they maintained the 1879 date) (Chibbaro 1990:214-215). Although the general interpretation is that these were issued in lieu of cash and were redeemable only at the Bradley store, these tokens might have been the daily chit or "due bills" that workers turned in weekly in exchange for cash.

The use of tokens was continued by Bradley's sons, Peter B. and Robert S., in their Ashepoo Bradley Lumber and Manufacturing Co. activities. Chibbaro (1990:31-32) reports that a variety of aluminum tokens in denominations from 1¢ to $1 were issued. Although no dates occur on these tokens, the company operated from 1919 through the mid-1930s.

The only oral history specific to the mine has been collected by Lindsay (1977). Bubberson Brown reported,

> My daddy and my wife's daddy worked at the Rock Mines, the Bulow mines is where they worked. Daddy worked through the week, and came home on the weekends. The wages were very high, though only a little of the money paid to the men got home to Edisto. They were paid by the pit. Two men would pair off and work together and they would get paid according to how large a put they dug and loaded onto the cars. The rock was put on tramcars which ran on a narrow-gauge track out of the mine. . . . Before he came home to farm, Daddy went to work at the rock mines, the Bulow mines. That was in the 1890's. He worked in a supervisory capacity. It was a pretty rough crowd that worked there - Irish and Italians and Colored. Every Friday evening and Saturday they would spend drinking, gambling and fighting. They had a killing over there every Saturday night. Didn't miss a one according to what Daddy said. A white Edistonian (J. G. Murray) expanded on Brown's story: The company had a rule: the men could get money on Monday morning, an advance on next Friday's pay, enough for food and tools for the week. They did that because most of the men would have gambled and drunk their wages all away. They got a good wage, but it would be gone by Monday. Invariably the ones that made the most wages and worked the hardest had the least left by Monday, and the ones that were laziest and hardly worked at all had the most. That was the professional gamblers that had ended up with the money - they didn't

need to work (Lindsay 1977:22-23).

Not every detail of this account can be confirmed (for example, we have found no evidence of Irish workers at Bulow). Likewise, we have not sought to document a killing every weekend, although we did encounter at least one homicide, that of "Lazarus Myers, colored, at Bulow Phosphate Mines" ("A Terrible Record," *The Freedman Newspaper*, June 9, 1891).

A local resident explained that his parents, when he was very little (ca. 1920) lived on Bulow and tended crops (Mr. Jake Hamilton, personal communication, 2006). He was adamant that they did not mine rock, and given the time period under discussion, this is probably true. It seems likely that after mining ceased at Bulow, at least some African Americans remained on the property, continuing to tend the fields that had been previously given to them by the Bulow management. A small community remained at the mine for a number of years after mining ceased.

Bradley's Other Holdings

Besides his interests in Bulow Mines and the River & Marine Mining and Manufacturing Co., William L. Bradley was involved in other land mines. He, and later his sons Peter B. Bradley (born 1850) and Robert S. Bradley (born 1856), acquired land from the Wando River to the Ashepoo, including property on Charleston Neck.

In 1879 the Charleston District Master-in-Equity deeded to W. L. Bradley "All the real estate of Ashepoo Phosphate Company in Charleston County. Being two tracts: a 22-acre parcel (5 acres high land, 17 acres marsh) together with a 20' wide strip connecting it with the Plank Road and a 10' wide strip connecting to the railroad." Joseph A. Robertson, president of Ashepoo Phosphate, gave Bradley Fertilizer Company a quit-claim to the land (Charleston County RMC DB C23, p. 214).

In January 1887 William L. Bradley purchased from Gouverneur M. Wilkins a tract of 5748.89 acres in St. Pauls Parish (then part of Colleton County), formerly the property of T. O. Lowndes and composed of several plantations: Poplar Grove, 750.84 acres formerly owned by Charles Rowand; Wieners, 460 acres formerly owned by Clark; Marchant and Frasier, 470.1 acres; Tom Cains, 636 acres; oaks, 599.89 acres; Oakland and Clark, formerly owned by Col. Drayton, Charles P. Dawson et al., 2830.9 acres (this land was part of the large holdings transferred by Peter and Robert Bradley to Bradley Realty in 1923, Charleston County RMC DB L32, p. 192).

American Agricultural Chemical Company

William Bradley died in December 1894 and Bradley Fertilizer was taken over by his sons, Peter B. and Robert S. Bradley. By 1899 Bradley Fertilizer was reorganized as American Agricultural Chemical Company. The firm was reputedly put together for the explicit purpose of acquiring and consolidating northern fertilizer plants in response to the growth of the Virginia-Carolina Fertilizer Company (organized in 1895). According to Moody's 1946 Industrial Manual, the Agawa Co. was established in 1893, and changed its name to American Agricultural in 1899.

American Agricultural Chemical Co. is an interesting sidebar to the history of the Bradley operations. The Bradleys shifted their emphasis to Florida, where they acquired stock in many small mining companies, such as the Peace River Phosphate Mining Company. By 1900 they controlled 22 of the largest fertilizer companies in America and had authorized capital of $40,000,000 (Bryan 1900). They also acquired companies that would help solidify their market. For example in 1916 they acquired the Cabin Branch Mining Company, a concern that mined pyrites, an essential ingredient in the

Figure 41. An aerial view of Brandley's fertilizer plant in Boston under American Agricultural Chemicals.

manufacture of the sulfuric acid critical for superphosphate production.

By 1914, the manufacture of fertilizers was the largest industrial activity in America, and it was controlled by three companies: Virginia-Carolina Chemical Co., American Agricultural Chemical Co., and a relative newcomer, the International Agricultural Chemical Co. (formed in 1909). Production of superphosphates grew from 1.8 million tons in 1905 to 2.9 million tons in 1913 (Haber 1958:175).

American Agricultural Chemical Co. was acquired by Continental Oil Company (today ConocoPhillips) in 1963 and, in 1972 was spun off as Agrico Chemical Company, being sold to Williams Companies, which had a variety of diversified subsidiaries, such as Colonial Life Insurance. In 1987 Williams Companies sold Agrico to Freeport-McMoran Resource Partners, Ltd. of New Orleans. In 1993 IMC Fertilizer merged with Agrico to form IMC Agrico, a subsidiary of IMC Global, a multibillion dollar, transnational corporation. In 2000 IMCAgrico became IMC Phosphates and in 2004 IMC Global, still possessing IMC Phosphates Co., merged with Cargill Crop Nutrition to form Mosaic. This company advertises itself as "one of the world's leading producers and marketers of concentrated phosphate and potash crop nutrients. For the global agriculture industry, Mosaic is a single source for phosphates, potash, nitrogen fertilizers and feed ingredients" (Mosaic web site, http://www.mosaicco.com/, April 28, 2006).

The Bradley Brothers

Although there is no mention of American Agricultural Chemical Company's South Carolina mines or property in the early Stockholder Reports available at the Baker Library of the Harvard Business School, Peter and Robert Bradley and the Bradley Fertilizer Company continued to acquire land in the Lowcountry through the first decade of the twentieth century.

In 1898 W. Mazyck Simons of Charleston conveyed a tract of land on Charleston Neck to Bradley Fertilizer Company for $5. One mile above the Charleston City limits, on the east side of Ashley River, the parcel was described as "16 acres high land, 13 acres marsh bounded east on public road, west on Ashley River, and south on land now or late of Ashepoo Phosphate Company" (Charleston County RMC DB E22, p. 192).

Later in 1898, an auction was ordered to settle the case of Alfred Malcolmson against Wappoo Mills et al. In June 1900, the one-half interest of C. C. Pinckney Jr. in a number of

tracts "suspected to contain phosphates" was conveyed to Peter and Robert Bradley. The other half-interest had previously been acquired by William L. Bradley (Charleston County RMC DB L27, p. 46, DB Y25, p. 147). The tracts were all in Colleton County, generally located near the Edisto River. Several of these parcels had been conveyed by William Lawton and J. C. Keckley to C. C. Pinckney Jr. in 1868, including the Walter Tract on Edisto River, St. Bartholomews Parish, 710 acres as conveyed by the Pacific Guano Co. et al. to Samuel G. Wayne; the Fishburne tract, 415 acres south of Walter, at the west side of Edisto River; Hoats Plantation (part of Jacksonboro Hotel Tract), 555 acres south of Fishburne at the west side of the river; Cedar Grove Plantation, 150 acres, with "all the exclusive right to dig, mine, and removed from the 50-acre adjoining tract all the phosphate rock that may be found therein".

Other tracts owned jointly by Pinckney and Bradley and conveyed to the Bradley brothers in 1900 were Spring Hill, 400 acres; two tracts totaling 111 acres; Hoats, 1012 acres at the south side of Edisto River; Stokes tract, 93 acres; and the Cox tract, 47 acres at west side of Edisto River, bounded south by the public road to Jacksonboro Ferry. There were also phosphate rights on the 25-acre Perkins property, 215-acre Martin Tract, and 355 acres of LaRoche Tract, and a 20-year phosphate lease (1891-1911) for mining at the 1,100 acre Sterling Plantation.

In 1905 the Bradley brothers purchased several tracts in Christ Church and St. Thomas & St. Denis parishes (Charleston County RMC DB Y24, p. 8). These included Charleywood Plantation, 1,354 acres less 80 acres of rice land previously sold to Mrs. Hugh Rose, on the east side of the west branch of Wando River; Chantilly Plantation, 450 acres on the west side of Charleywood; and the Wando Tract in Christ Church Parish, 654 acres - thought to be contained within Charleywood (Charleston County RMC DB W24, p. 102); and a tract in St. Thomas and St. Denis Parish, 166 acres, formerly known as Kennedy (Charleston County RMC DB T24, p. 59). Except for Chantilly, all the tracts were conveyed subject to existing timber leases (all transferred to Bradley Real Estate in 1923, Charleston County RMC DB L32, p. 162).

In December 1910, George S. Pardue sold Peter and Robert Bradley an option to purchase the 850-acre "Magwood Property" east of the Bolton Mines property. During the life of the option the Bradleys had the right to "enter and examine the said land for phosphate rock and phosphatic deposits, or other minerals, or for any purpose which they may desire, by the usual modes of soundings, excavations, etc." Had they exercised their option, the agreed-upon purchase price would be $25,000. It is not certain how much, if any, exploration the Bradleys conducted. The option expired without their purchasing the property (Charleston County RMC DB Y25, p. 15).

The American Agricultural Chemical Company absorbed the Ashepoo Fertilizer Company, and the Bradley brothers eventually purchased Bolton Mines as well. In 1911, they paid $20,000 for a two-fifths share in the 2,994-acre Bolton tract (Charleston County RMC DB H26, p. 41). The conveyance was subject to a lease held by the Bolton Mines Company under an agreement made in February 1909. In 1923 Peter B. Bradley and Robert S. Bradley transferred this two-fifths ownership to their Bradley Realty Corporation (Charleston County RMC DB L32, p. 165). In 1931 the remaining heirs to the Bolton Mines business conveyed their share of the land to Bradley Estates, Inc. (Charleston County RMC DB U50, p. 387), and in 1949 the two Bradley entities conveyed entire ownership of the Bolton property to members of the McLeod family, who were involved with McLeod Lumber Company (Charleston County RMC DB U50, p. 587-592).

Much better-known locally than his brother Robert, Peter B. Bradley spent winter months in South Carolina until his 1933 death in Boston. In 1931 the Charleston *News and Courier* featured Peter Bradley's holdings near

Rantowles, notably his winter home "for forty years" at Bulow Plantation (*News and Courier* March 8, 1931) Here he entertained, hunted game, attempted cattle husbandry, and enjoyed his fine Arab horses (*News and Courier,* March 20, 1939, February 28, 1943). He had a separate estate on the Ashepoo River in Colleton County, on part of the timber acreage he managed for the Bradley Lumber Company ("Peter B. Bradley, 83, Dies of Hurts," *News and Courier*, August 27, 1933.)

Bradley Realty Corporation

As mentioned above, Bradley Realty Corporation of Massachusetts conveyed the 3,034-acre study tract to C. P. Cuthbert in 1948. Cuthbert was a timber cruiser for West Virginia Pulp and Paper and began familiar with the property when the company considered purchasing the property itself. They decided against the purchase, but Cuthbert, quitting his job, purchased the land, initially for its timber and later for cattle and hunting.

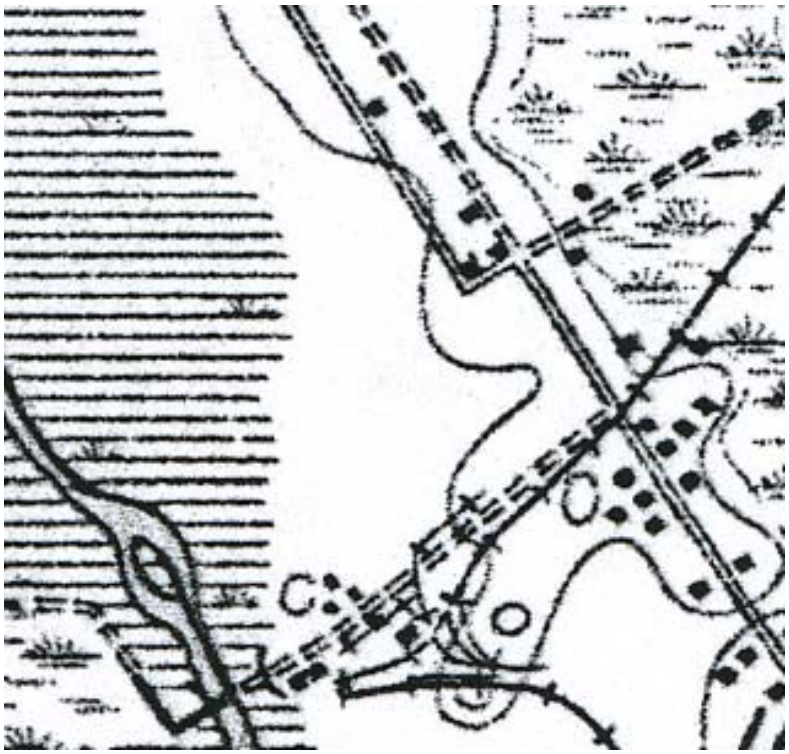


Figure 42. Extent of the Bradley settlement in 1918 – all of these structures are off the study tract. In the south central area are structures associated with the Bulow Mine's processing area, including the rail lines and switching yard. These would have includes the four washers and other support buildings. Elsewhere are workers' houses, as well as the mine hospital and other support structures. One of these may also have been the building eventually used by the Bradleys as their summer retreat.

By 1923 Peter B. Bradley of Higham, MA and Robert S. Bradley of Beverly, MA conveyed most of the Charleston County real estate in their joint ownership to their Bradley Realty Corporation. The property included the "plantation or tract of land now or formerly known as Long Savannah and now sometimes called Bulow 3300 acres more or less," two adjoining parcels (one of five acres, the other 166 acres) that had been conveyed by William Cox to their father, and a 1/2 acre parcel described as "the land on which now or formerly stood a house formerly erected by Frank Bull, as conveyed by deed of J. A. Leland, Master, to W. L. Bradley 3/21/1887" (Charleston County RMC DB L32, p. 158).

During his ownership much of the property was fenced, and horses and cattle were on the property until the late 1950s. Cuthbert did not live on the tract, but retained an African American named Jake, living just off the tract on Bear Swamp Road, to care for the property and its livestock. The stable and an artesian well pump were located in the first field as you entered the property on the left (west)

Figure 43. Upper photos show a guard house associated with the Bulow mine, relocated from its original position along Hughes Road to a parcel that is not part of the study tract. The newspapers date 1937 and cover a horizontal bead board. The lower photographs show a second building thought to be associated with the Bulow mine or Bradley Estate (also off the study tract).

(Rhett Campbell, personal communication, 2006).

Most of the rest of J. J. Bulow's Long Savannah was sold the year after Cuthbert's purchase. On June 22, 1949, Edna Maud Foster paid $10 for the "18.5-acre portion of Bulow bounded by roads and by lands to be conveyed by Bradley Realty to Julia C. McLeod, who will retain easement of use of Washer Road" (Charleston County RMC DB U50, p. 145). On the same day, Julia C. McLeod (one of the purchasers of the Bolton tract) paid $20,000 for the all of Long Savannah Plantation, except the portion previously conveyed to C. P. Cuthbert, the part being conveyed to E. M. Foster, and the 166-acre tract of marsh land conveyed by Cox to Bradley in 1889 (Charleston County RMC DB U50, p. 149).

METHODS

Archaeological Field Methods

The initially proposed field techniques involved the placement of shovel tests at 100-foot intervals along transects placed at 100-foot intervals. Additional 50-foot shovel tests and transects would be added when sites were encountered. Based on discussions with the State Historic Preservation Office it was decided that the survey would be focused on those areas most likely to contain archaeological resources, specifically better drained soils and areas not disturbed by phosphate mining. Thus, transects were laid out based on the Charleston County soil Survey (Miller 1971) and supplemented with field observations during the course of the study. In addition to those areas which received formal shovel testing, additional areas were subject to pedestrian survey and random shovel testing, primarily to confirm the condition of soils (i.e., wet or disturbed by mining operations).

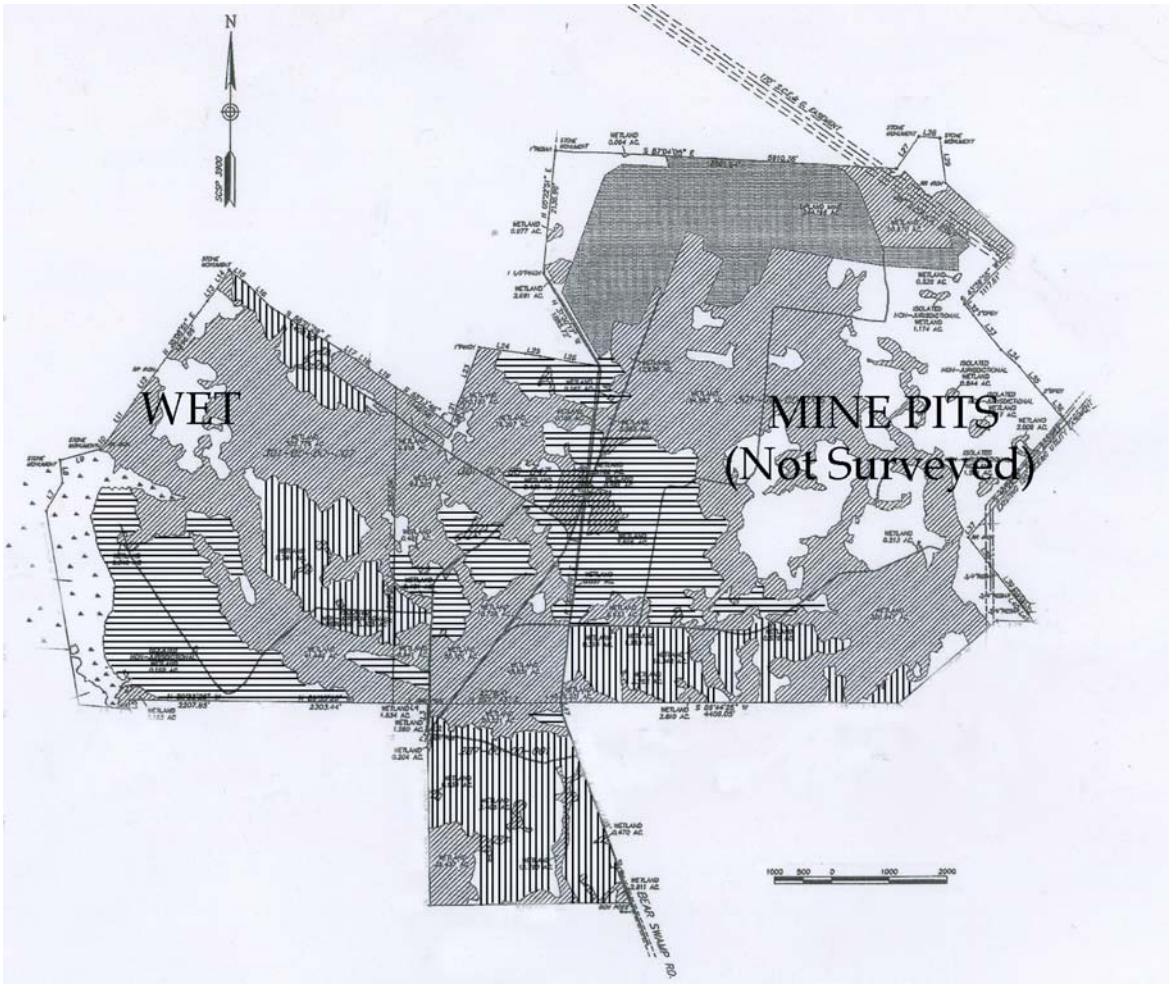


Figure 44. Project area showing transects, wetlands (diagonal hash marks), and other areas not surveyed.

Figure 45. View of Bear Swamp Road in the project area.

For the tract, a total of 288 transects were set up at 100-foot intervals along the various dirt roadways and other access points (Figure 44). A total of 2,348 shovel tests were excavated in the survey area covering approximately 580 acres – the remainder of the tract's 1,642 acres of uplands has been heavily impacted by mining and no longer exhibit intact soils. Another 1,327 acres are wetlands and the remaining 82 acres of the parcel are marsh (representing old rice fields but not involved in any development activity).

All soil was to be screened through ¼-inch mesh, with each test numbered sequentially by transect. Each test would measure about 1 foot square and would normally be taken to a depth of at least 1.0 foot or until subsoil was encountered. All cultural remains would be collected, except for mortar and brick, which would be quantitatively noted in the field and discarded. Notes would be maintained for profiles at any sites encountered.

As previously mentioned, as sites were identified (defined by the presence of three or more artifacts from either a surface survey or shovel tests within a 50 feet area), additional testing would be performed at 50-foot intervals to obtain the boundaries. Testing would be performed until two consecutive negative tests were encountered in the four cardinal directions. The information required for completion of South Carolina Institute of Archaeology and Anthropology site forms would be collected and photographs would be taken, if warranted in the opinion of the field investigators.

The GPS positions were taken with a WAAS enabled Garmin GPS 76 rover that tracks up to twelve satellites, each with a separate channel that is continuously being read. The benefit of parallel channel receivers is their improved sensitivity and ability to obtain and hold a satellite lock in difficult situations, such as in forests or urban environments where signal obstruction is a frequent problem. WAAS, or Wide Area Augmentation System, is a system of satellites and ground stations that provide GPS signal corrections, yielding higher position accuracy – generally an accuracy of 10 feet or better 95% of the time. Both are vital concerns for the study area.

Architectural Survey

As previously discussed, we elected to use a 0.5 mile area of potential effect (APE). The architectural survey would record buildings, sites, structures, and objects which appeared to have been constructed before 1950. Typical of such projects, this survey recorded only those which have retained "some measure of its historic integrity" (Vivian n.d.:5) and which were visible from public roads.

For each identified resource, we would complete a Statewide Survey Site form and at least two representative photographs were taken. Permanent control numbers would be assigned by the Survey Staff and the S.C. Department of Archives and History at the conclusion of the study. The Site Forms for the resources identified during this study would be submitted to the S.C. Department of Archives and History.

Site Evaluation

Archaeological sites will be evaluated for further work based on the eligibility criteria for the National Register of Historic Places. Chicora Foundation only provides an opinion of National Register eligibility and the final determination is made by the lead federal agency, in consultation with the State Historic Preservation Officer at the South Carolina Department of Archives and History.

The criteria for eligibility to the National Register of Historic Places is described by 36CFR60.4, which states:

> the quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and
>
> a. that are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> b. that are associated with the lives of persons significant in our past; or
>
> c. that embody the distinctive characteristics of a type, period, or method of construction or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
>
> d. that have yielded, or may be likely to yield, information important in prehistory or history.

National Register Bulletin 36 (Townsend et al. 1993) provides an evaluative process that contains five steps for forming a clearly defined explicit rationale for either the site's eligibility or lack of eligibility. Briefly, these steps are:

> ▪ identification of the site's data sets or categories of archaeological information such as ceramics, lithics, subsistence remains, architectural remains, or sub-surface features;

Figure 46. Taking notes at 38CH2084.

- identification of the historic context applicable to the site, providing a framework for the evaluative process;

- identification of the important research questions the site might be able to address, given the data sets and the context;

- evaluation of the site's archaeological integrity to ensure that the data sets were sufficiently well preserved to address the research questions; and

- identification of important research questions among all of those which might be asked and answered at the site.

This approach, of course, has been developed for use documenting eligibility of sites being actually nominated to the National Register of Historic Places where the evaluative process must stand alone, with relatively little reference to other documentation and where typically only one site is being considered. As a result, some aspects of the evaluative process have been summarized, but we have tried to focus on an archaeological site's ability to address significant research topics within the context of its available data sets.

Laboratory Analysis

The cleaning and analysis of artifacts was conducted in Columbia at the Chicora Foundation laboratories. These materials have been catalogued and accessioned for curation at the South Carolina Institute of Archaeology and Anthropology, the closest regional repository. A site form for each of the identified archaeological sites has been filed with the South Carolina Institute of Archaeology and Anthropology. Field notes have been prepared for curation using archival standards and will be transferred to that agency as soon as the project is complete.

Analysis of the collections followed professionally accepted standard with a level of intensity suitable to the quantity and quality of the remains. In general, the temporal, cultural, and typological classifications of historic remains follow such authors as Price (1979) and South (1977).

RESULTS OF SURVEY

Introduction

As a result of this cultural resources survey, ten archaeological sites (38CH2025 and 38CH2081-2089) were identified (Figure 47). Site 38CH2025 is the Bulow Cemetery, which is recommended eligible for the National Register. Site 38CH2081 consists of the remains of structures associated with the nineteenth to twentieth century Bulow Mines that is potentially eligible for the National Register. Site 38CH2082 is the remains of nineteenth to twentieth century structures that are recommended not eligible for the National Register because of their lack of integrity and inability to address significant research questions. Site 38CH2083 consists of remains dating from the eighteenth to nineteenth century that are recommended not eligible for the National Register for their lack of integrity. Site 38CH2084 is the nineteenth to twentieth century mining village associated with the Bulow Mines and is potentially eligible for the National

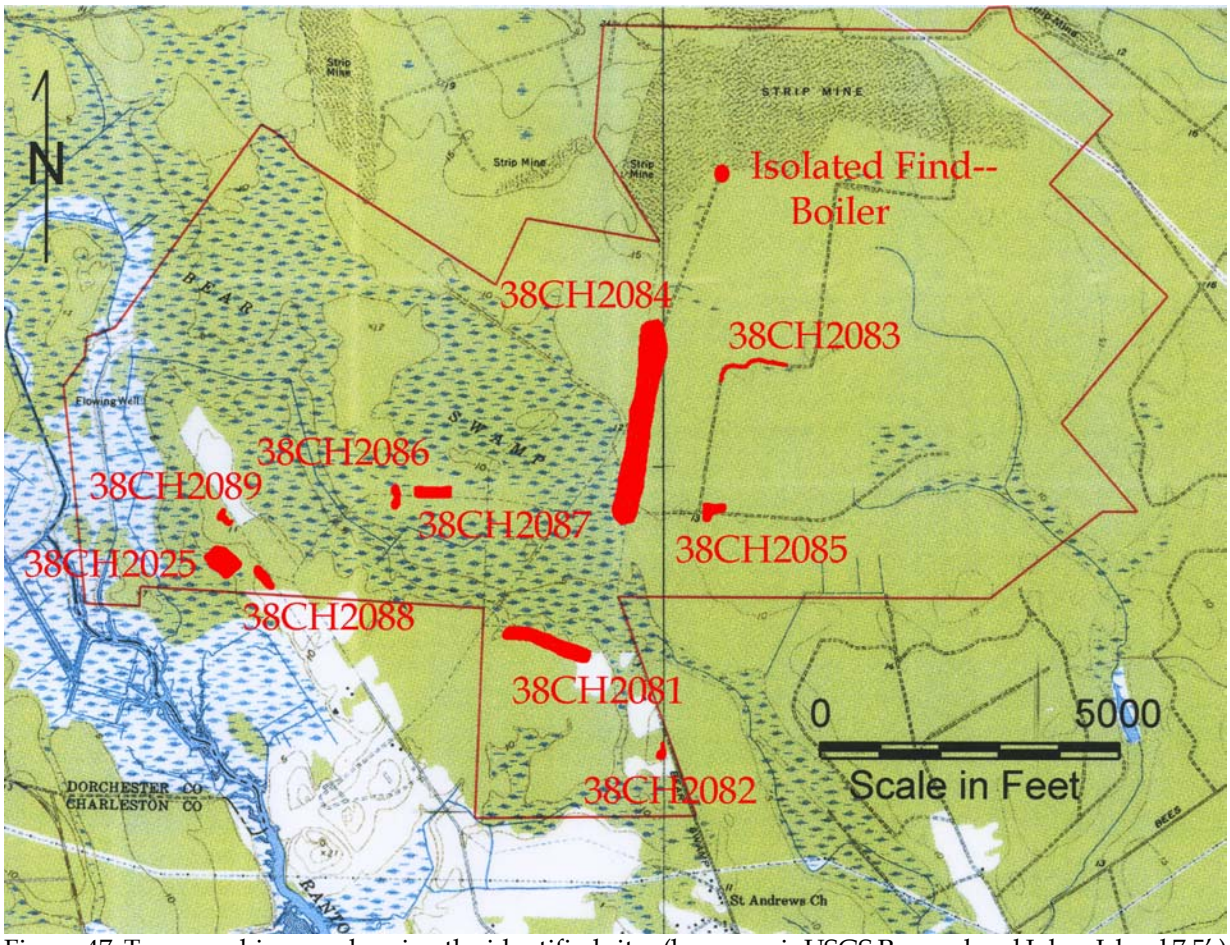


Figure 47. Topographic map showing the identified sites (basemap is USGS Ravenel and Johns Island 7.5'.)

Register. Site 38CH2085 consists of the remains of late nineteenth century structures that are potentially eligible for the National Register. Site 38CH2086 is the remains of an eighteenth to nineteenth century settlement that is recommended not eligible for the National Register for its lack of integrity and sparse remains. Site 38CH2087 is a nineteenth to twentieth century domestic site that may be related to the Bulow Mines and is potentially eligible for the National Register. Sites 38CH2088 and 38CH2089 are eighteenth century settlements that are potentially eligible for the National Register.

It should be noted that sites 38CH2081, 38CH2084, 38CH2085, and 38CH2087 have two or more individual structures associated with the area. While sketch maps and artifact tables will differentiate between the structures, no attempt will be made, at this basic level of survey, to report on each individual structure. The analysis will be made on the site as a whole.

The architectural survey did not identify any structures or other resources beyond those identified by the 1992 survey, none of which were in the project APE (Fick 1992). We should note that there are structures in the APE that are almost certainly associated with the Bradley estate, including a guard house, a garage/utility structure, and a possible servant's dwelling (several of these structures have been illustrated in Figure 43).

These structures have not been formally surveyed for several reasons. Most fundamentally, they are not on public roads and not on the survey tract; while allowed to visit the property, we were not in a position to formally record the structures. These buildings are, however, on tracts that are in the process of being developed and we presume that the consultant retained for that work will record and evaluate them more fully. In addition, since these structures are likely to be directly impacted by development activities, we do not believe that they will in any way be indirectly affected by the current undertaking.

Archaeological Resources

38CH2025

Site 38CH2025 (Figure 48), also known as the Bulow Cemetery, Bulow Mines Cemetery, or the Bulow Plum Patch Cemetery, is at least a late nineteenth to twentieth century African American

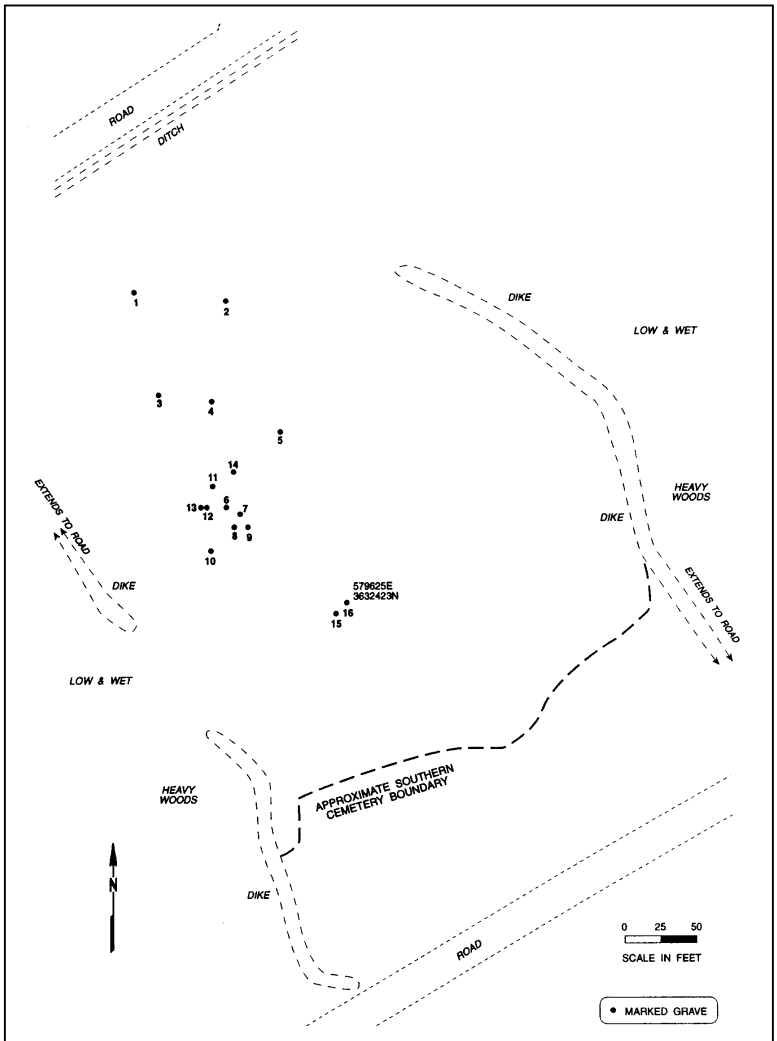


Figure 48. Sketch map of Bulow Cemetery.

cemetery located on the edge of Bear Swamp at an elevation of about 5 feet AMSL. A central UTM coordinate for the site is 579625E 3632423N (NAD27 datum).

The cemetery was first recorded during the November 2004 Cultural Resources Assessment (CRA) of the property, then revisited in September of 2005 to more accurately determine the boundaries (see Trinkley 2005 for an in-depth study of the cemetery).

The site contains fifteen marked graves with headstones of commercial marble, military marble, dresser top marble, wood, and concrete (see Table 7). A large number of grave goods are also present including such items as an amethyst press glass pitcher, a milk glass candle holder, and a molded whiteware plate (see Table 8). The quantity and variety of grave goods in significant since many black cemeteries have either been "cleaned up" or vandalized, so that grave goods such as these are no longer present. The presence of alternative markers – such as dresser tops and even wood slabs – is also very significant, revealing virtually no disturbance to the cemetery.

While assessing the boundaries of the cemetery, an additional 200 unmarked graves were identified by sunken depressions from either the collapse of the grave shaft and remains. Since not all graves were identified during the reconnaissance (one a sufficient number to allow the boundaries to be established), it is likely that at least double this number of remains are present.

Table 7.
Marked Graves at Bulow Cemetery

Grave No.	Name	Birth Date	Death Date	Material
1	James Black	August 20, 1892	January 8, 1925	commercial marble
2	David Harmond	-	[1903]	military marble
3	Peter Williams	-	[1919]	military marble
4	Daniel Grayson	March 15, 1853	December 19, 1899	commercial marble
5	Benjamin Rodan	-	-	military marble
6	-	-	-	dresser top marble
7	-	-	-	wood marker w/marble "B.W."
8	Anne Matthews	May 7, 1875	April 7, 1915	commercial marble
9	A.C.	-	-	commercial marble
10	H.C. Gibbs	1852	November 2, 1892	commercial marble
11	Culliott Gibbes	-	[1914]	military marble
12	Charles Heyward	-	October 6, 1939	military marble
13	Edna Gibbs	November 22, 1917	November 12, 1920	commercial concrete
14	-	-	-	marble
15	?	?	?	hand-made concrete

The cemetery is located in a heavily wooded area separated from the nearby swamp by a dike. The local black community had removed much of the underbrush between the original CRA (in 2004) and the revisit (in 2005). The soils in the cemetery were Yonges loamy fine sand, which have an A horizon of dark grayish brown (10YR4/2) loamy sand, although the clay content increases dramatically by at least 14 inches (Miller 1971). Soil borings in the cemetery reveal clay at or within inches of the surface. This is likely evidence of the very intensive use of the cemetery and provides additional support for the very large number of graves present.

The cemetery was used at least by 1892 (the earliest marked grave), although the presence of four Civil War veterans who would have been born into slavery, plus two additional individuals whose birth dates, according to their stones, would also have been during slavery, provides strong evidence that the cemetery dates at least to the antebellum and was likely associated with the nearby Bulow Plantation.

The last observed death date is in 1939, which is supported by the lack of concrete vault top markers, metal floral stands, and metal funeral home markers – all indicators of burials during the second half of the twentieth century. Several death certificates have been identified for the cemetery, confirming the cemetery's name and providing additional information on several of the individuals documented for the cemetery. Additional examination of the death certificates would also assist in developing a more complete list of twentieth century burials in the cemetery, but this work has not been conducted as part of this study.

The site covers about 4 acres (approximately 500 feet north-south by 350 feet east-west). This boundary was determined from the visible graves (headstones and depressions) and the location of dikes on the east and west sides.

In all respects, the cemetery is characteristic of African American burial grounds. There are abundant sunken depressions; few of the graves are marked by permanent markers; where permanent markers are found they range from commercial stones to concrete to wood; there are abundant grave goods throughout the cemetery; and the graves are found loosely clustered (probably reflecting kin-based groupings).

Table 8.
Selected Grave Goods Identified at Bulow Cemetery

Grave No.	Death Date	Grave Goods	Estimated Date	Sources
3	1919	amathyst pressed glass pitcher	pre-1919	Jones and Sullivan 1985:13
		decalcomania whiteware w/maker's mark	post 1904	Godden 1964:432
		milk glass candle holder	late 19th c. on	Jones and Sullivan 1985:14
8	1915	clear glass canning jar		
		clear pressed glass wine glass		
		decalcomania whiteware w/maker's mark	1876-1893	Lehner 1988:175
		amathyst pressed glass pitcher	pre-1919	Jones and Sullivan 1985:13
		molded whiteware plate		
11	1914	clear glass cup w/Maker's mark	1920-1964	Toulouse 1971:239
-	-	Grove's Tasteless Chill Tonic	1891-1934, ca. 1900	Fike 1987:234

Although the cemetery is known by the name of the late nineteenth century phosphate works on the property, the documented burials show no special association with the mine operatives. The presence of Civil War veterans, WPA laborers, and a domestic living in Charleston suggests that this was a community cemetery – not a mine cemetery. In other words, there is ample evidence to suggest that the cemetery was in existence and being used prior to – and after – the mine's operation. It was likely being used by the African Americans who had ties with this

property, whether they worked at the Bulow Mine or not.

The cemetery's physical setting may have been affected by twentieth century logging. There is evidence of some rutting and the ground compaction is very high. The cemetery is vegetated as African American cemeteries typically are (including heavily wooded areas and living memorials of the seasonal Snowflake flowers). The setting is also constrained by low, wet soils – resulting in dikes forming the eastern and western boundaries of the cemetery.

The Bulow Cemetery is recommended eligible for the National Register of Historic Places under Criteria C (physical features) and D (information potential). The cemetery has the range of features and characteristics that are typical of African American burial places. It is an excellent representation of the stylistic type.

The site retains excellent integrity, easily conveying the qualities that make the site significant. The isolated, rural site easily conveys the feelings of the overall setting consistent with its use during the nineteenth and early twentieth century. This feeling is assisted by the presence of the boundary dikes – providing a clear reminder of the economic origins of the plantation and the low, wet areas to which African American cemeteries were relegated by white landowners.

Figure 49. View of typical grave goods.

Figure 50 . View of a wood marker.

There is virtually no visible damage or modification to the cemetery nor is there evidence that any significant features have been lost. This is clearly revealed by the abundance of grave goods (Figure 49), the large number of clearly visible sunken depressions, the presence of a wood marker (Figure 50), and the presence of only one broken headstone. These characteristics are consistent of the cemetery's period of historic use and help convey a feeling that is consistent with African American burial locations.

The cemetery is likewise eligible under Criterion D, information potential. There is a very strong potential for the recovery of bioanthropological data (e.g., skeletal remains) that would address a broad range of questions concerning the health, diet, and disease of rural low country African Americans during the nineteenth and early twentieth centuries. The site would be of special interest since it does reflect a very rural population and it is likely that kin-groups would be recognizable in the arrangement and placement of the remains. The cemetery reflects a transitional period between plantation and modern medicine. There are suggestions, however, that African American health may actually have declined during the postbellum. Studies at sites such as the Bulow Cemetery would begin to allow these significant questions to be more fully examined. While not expressly associated with the mine, it might be possible to investigate injuries and bone deterioration that would be characteristic of phosphate mining.

In addition, the site would provide the opportunity to examine African American mortuary patterns typical of a rural, low income population. Several areas of study have already been briefly mentioned, such as the association of grave goods, and the temporal placement of those grave goods. Additional questions might involve the exploration of traditions documented through oral history, such as the use of coins on the eyes or the inclusion of salt in the coffin. Other research might involve the examination of soil samples to determine the frequency of embalming, which would be expected to leave tale-tell traces of heavy metals, such as arsenic.

There would also be an opportunity to explore the use of coffins and coffin hardware, looking at the incidence of trimmed verses untrimmed coffins, or the prevalence of shrouds as opposed to dressed bodies.

Finally, the cemetery offers an exceptional opportunity to explore maternal DNA to determine geographic origins of the African

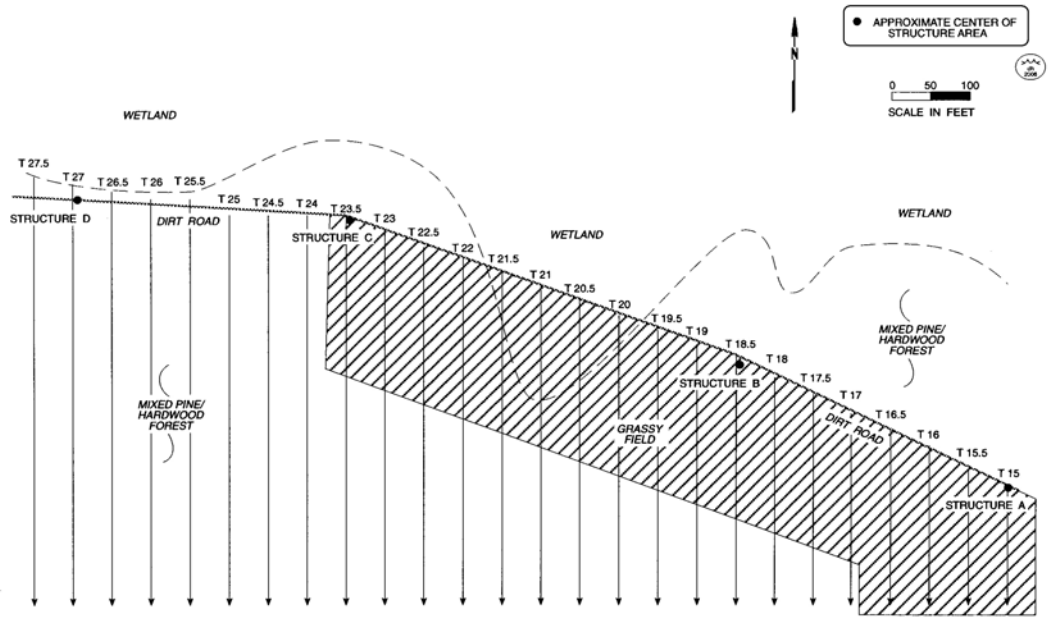


Figure 51. Sketch map showing 38CH2081.

American population that called Bulow home. Previous research with archaeological collections reveals that DNA can survive and yield reliable data on matrilineal descent.

Overall, the cemetery exhibits excellent integrity of location, design, setting, materials, workmanship, feeling, and association. The cemetery meets Criteria Consideration C for cemeteries since its significance involves design characteristics and forensic data.

Steps should be taken to further preserve and secure the cemetery prior to construction activities. The local African American community has already made significant steps toward clearing the dense understory from the cemetery. The piles of brush, however, need to be removed. In addition, it will be important to protect the cemetery from the curious and relic collector as it becomes more visible and better known. A chain link fence is recommended to ensure that unauthorized individuals are excluded from the grounds. Finally, it is necessary to take steps to ensure the long-term preservation of those stones that are present.

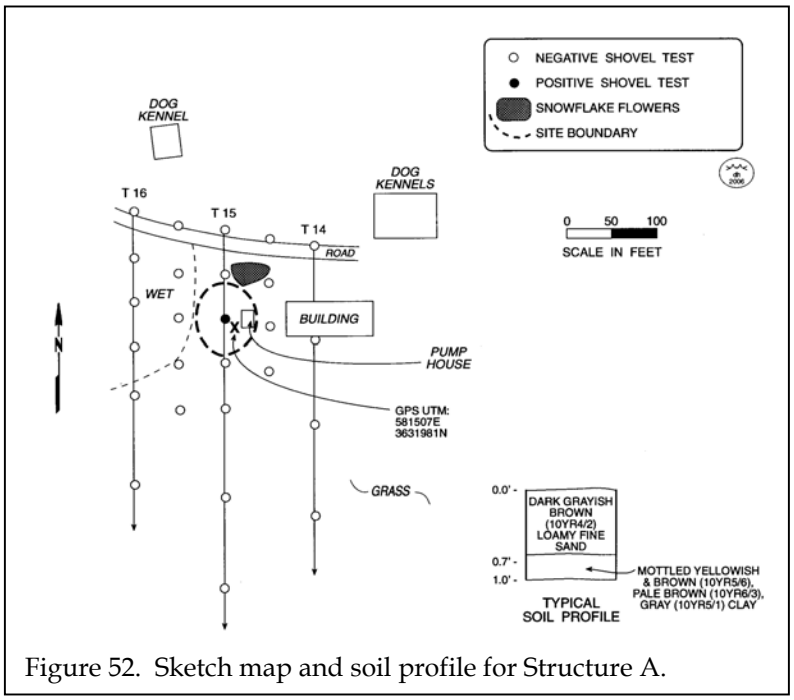


Figure 52. Sketch map and soil profile for Structure A.

No construction activities should take place on the cemetery grounds, including the storage of equipment. A buffer zone around the cemetery is recommended to insure that no harm will come to the grounds.

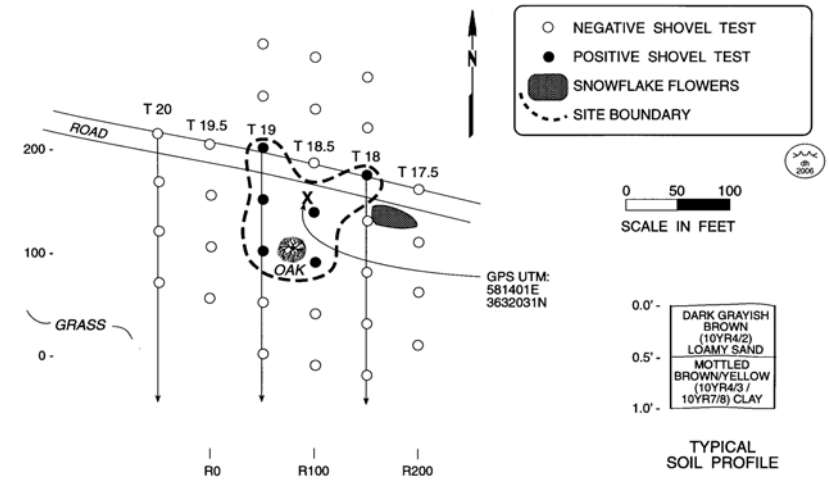


Figure 53. Sketch map and soil profile for Structure B.

38CH2081

Site 38CH2081 consists of the remains of a row of structures related to the late nineteenth to early twentieth century Bulow Mines (Figure 51). It is located at an elevation of about 10 feet AMSL along the edge of Bear Swamp. Four distinct structures (A-D) (Figures 52-55) were identified within the site area and a central UTM coordinate (NAD27 datum) was taken at each structure: A – 581507E 3631981N; B – 581401E

3632031N; C – 581247E 3632089N; D – 581127E 3632097N.

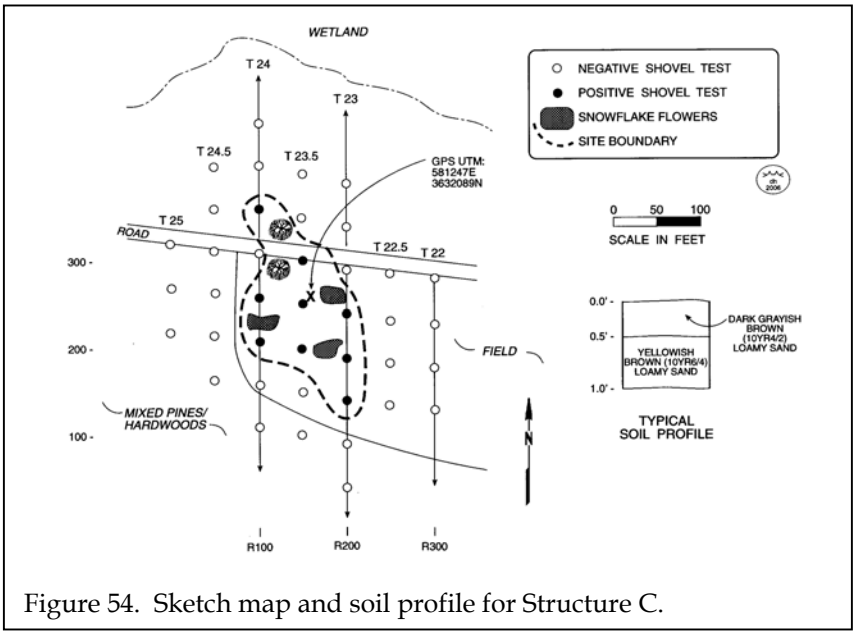


Figure 54. Sketch map and soil profile for Structure C.

Shovel testing in this area was performed at 50-foot intervals given the probability of finding structures – at least three historic maps including the 1918 Ravenel Quadrangle (Figure 8), the 1929 *Sanitary and Drainage Commission* map (Figure 9), and the 1944 Ravenels 15' topo (Figure 10), show the cluster of structures. The 133 shovel tests generally produced two different types of soils, the moderately well drained Hockley loamy fine sand and the poorly drained Yonges loamy fine sand. Hockley soils generally have an Ap horizon of dark grayish brown (10YR4/2) loamy fine sand to 0.8 foot in depth over a light yellowish brown (10YR6/4) loamy fine sand to just over 1.0 foot in depth. Yonges soils have an Ap horizon of dark grayish brown (10YR4/2) loamy fine sand to 0.8 foot over a light brownish gray (10YR6/2) loamy fine sand to 1.2 foot in depth.

However, the subsurface in many of the tests were a mottled yellowish brown (10YR5/6), pale brown (10YR6/3), and gray (10YR5/1), which may point to extensive disturbance of the landscape, perhaps prior to the development of the structures at this location. Structure D produced a profile of dark gray (10YR4/1) loamy sand to a depth of 0.8 foot over a grayish brown (10YR5/2) loamy sand, however, almost every shovel test produced a slightly different profile.

The site stretches from the existing hunting camp (Figure 56), west along Bear Swamp for about 1,500 feet, but the widest point north-south is about 200 feet. The previously discussed historic maps show five to six structures along the road, however, only four distinct clusters were found during this study.

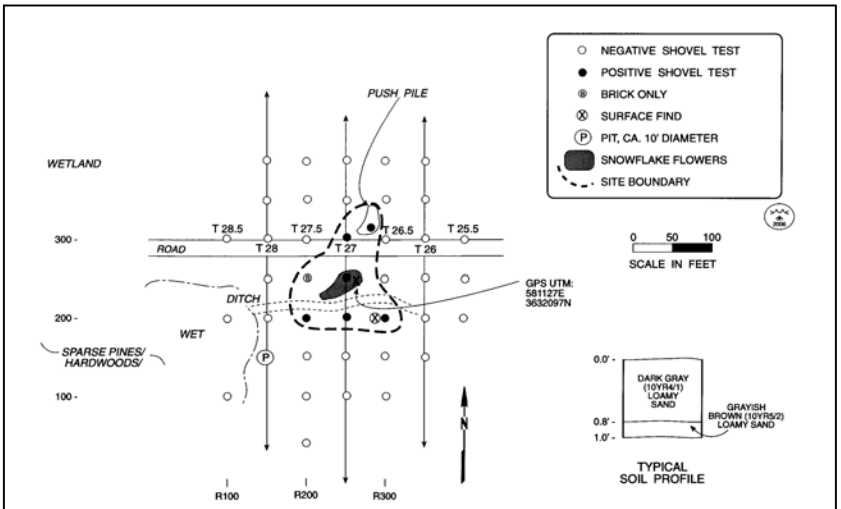


Figure 55. Sketch map and soil profile for Structure D.

The 'missing' structures may be the result of either the construction of the hunting camp (which appears to have significantly truncated Structure A), or the intrusion of wetland between structures

Figure 56. View of the hunting camp on the property.

B and C or to the west of D. It is also possible that not all structures were inhabited, with buildings such as stables leaving a very ephemeral archaeological footprint overlooked during 50 foot testing.

The site appears to date from the late nineteenth to the early twentieth century (Table 9). While relatively sparse (only 59 total artifacts were recovered), four separate data sets (Kitchen (71%), Architecture (17%), Furniture (2%), and Activities (10%) Groups) were found.

Very few ceramics were recovered (n=4), but those recovered were all considered to be inexpensive (undecorated whiteware and annular whiteware). The former has a mean ceramic date (MCD) of 1860, while the latter has a MCD of 1866. Glass is less temporally sensitive, but manganese glass typically dates from the late nineteenth to the

Table 9.
Artifacts from 38CH2081

	Structure A	Structure B						Structure C									Structure D						
		90R100	100R80	140R100	150R80	180R150	200R80	140R200	190R200	200R150	210R100	240R200	250R150	260R100	300R150	360R100	200R150	200R200	200R250	250R200	300R200	315R230	
Kitchen Group																							
Whiteware, undecorated				1										1				1					
Whiteware, annular	1																						
Glass, clear				2			1				3		2		2				1	2	1	1	
Glass, brown				1																			
Glass, manganese			3	1	3	1				1					1		2	2					
Glass, milk												1											
Glass, light green								1															
Glass, light blue											1												
Glass, aqua																						4	
Glass, whole bottle (clear)																						1	
Architecture Group																							
Nail, UID fragment	1	1		1						1	1			1	1	1		1	1				
Furniture Group																							
Clear glass lamp globe																							
Activities Group																							
UID iron	2																						
Coal									3														
Iron hook																						1	
Total																							

Figure 57. View of the pit feature found at 38CH2081.

early twentieth century and milk glass was popular in the late nineteenth century (Jones and Sullivan 1985). The glass lamp globe (known as a font or fuel reservoir) came from a vertical wick lamp that is reported to have been manufactured at least by 1854 in the United States (Woodhead et al. 1984). All these dates are consistent with the time period of the Bulow Mines, which were in operation from the late nineteenth to the early twentieth century.

While no intact structural remains were found, one feature, an approximately ten foot diameter pit (Figure 57) was found to the south of Structure D. No testing was performed inside the pit because it was holding water, however, at least two feet of the pit were exposed and there were at least two feet of water (the exact depth is not known). No surface trash was found in the vicinity of the pit, as is typical of wells or privies, so the function of this pit is not known.

Another feature of the site is the abundance of snowflake flowers (*Leucojum aestivum*) at each of the four structures. Reported by Favretti and Favretti (1978:141) on their list of plants dating from 1776 to 1850 (and again on the list of plants from 1850 to 1900), the bulb is not reported by Westmacott (1992), perhaps because of its limited period of blooming. The Floridata website (www.floridata.com) describes the bulb as "a classic old timey bulb . . . often seen persisting in old cemeteries or abandoned homesites." It is a flower seen frequently in African American cemeteries if they are visited at the correct time. Adams (2004:248-249) briefly mentions them in the context of their similarity to snowdrop (*Galanthus nivalis*) indicating that both are heirloom plants. The snowflake is well suited to the moist soil, which is abundant throughout the tract. At least three large oaks were also observed at the site.

The previously discussed context reminds of how little is know concerning the lives and workers at phosphate mines. Six research topics are specifically outlined to examine the lives of African American workers. At least three of these questions are appropriate for site 38CH2081, including:

- identification of assemblages and patterns thought to be associated with mine or factory workers for comparison and contrast to those from slavery and agricultural tenancy;

- documentation of worker's cabins as part of an effort to determine the nature of construction and distinguish between the "shanties" and more substantial housing – as well as to compare and contrast phosphate or fertilizer housing with that found in slavery;

- research to document activities specific to the mines, including such divergent topics as ownership/possession of tools, use of a commissary, and heavy drinking or gambling that might support the "rowdiness" said to be typical of the camps.

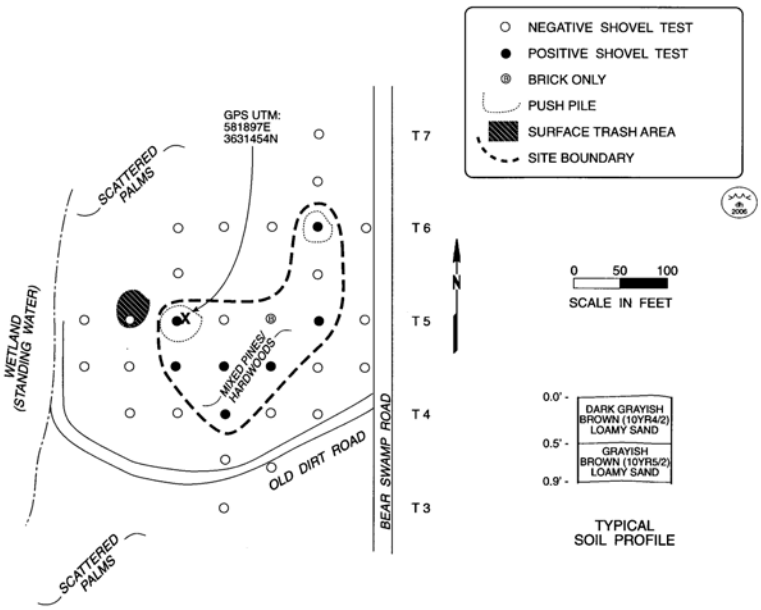


Figure 58. Sketch map and soil profile for 38CH2082.

We recognize, however, that this site does not contain above-ground architectural remains. In addition only 22 of the shovel tests (17% of the total) were positive. Consequently, we recommend site 38CH2081 potentially eligible for the National Register of Historic Places.

To more completely assess eligibility, we recommend additional testing, to be performed at 20-foot intervals across the site coupled with the excavation of two 5-foot units placed in different areas of dense remains. This will more accurately determine artifact assemblages, site boundaries, and help to determine if any below-grade architectural remains may be present.

38CH2082

Site 38CH2082 (Figure 58) is a nineteenth to twentieth century domestic scatter. It is located at an elevation of about 10 feet AMSL. A central UTM cooridinate for the site is 581897E 3631454N (NAD27 datum).

Shovel testing was originally completed at 100-foot intervals through the area until a positive shovel test (600R650) was encountered. Additional testing was performed at 50-foot intervals along the cardinal directions until two consecutive negative tests were encountered. A total of 31 tests were excavated with 23% positive. One additional test contained only brick.

The site is located in a mixed pine and hardwood forest. Shovel tests profiles suggest soils similar to the Yonges Series. Yonges soils have an Ap horizon of dark grayish brown (10YR4/2) loamy fine sand to 0.8 foot over a light brownish gray (10YR6/2) loamy fine sand to 1.2 foot in depth. In these tests the depths to this light brownish gray sand vary from 0.9 to 1.5 feet.

Table 10.
Artifacts from 38CH2082

	400R550	450R500	450R550	450R600	500R500	500R650	600R650	Total
Kitchen Group								**9**
Whiteware, undecorated				1				
Stoneware, Bristol glaze	1							
Glass, clear			2			1		
Glass, melted	2				2			
rchitectural Group								**5**
Nail, UID fragment	1	2			1		1	
Total								**14**

The late nineteenth to early twentieth century is date is based on sparse remains and the only temporally diagnostic specimen is a single

undecorated whiteware. Nevertheless, at least three historic maps – including the 1918 Ravenel Quadrangle (Figure 8), the 1929 *Sanitary and Drainage Commission* map (Figure 9), and the 1944 Ravenels 15′ topo (Figure 10) – show a series of structures in this area.

While multiple structures are shown on these maps, we were able to distinguish only one. The soil survey for the site shows the area as being a gravel pit (Miller 1971:Map Sheet 41), which may explain the lack of artifacts and structural remains, and the several push piles within the site.

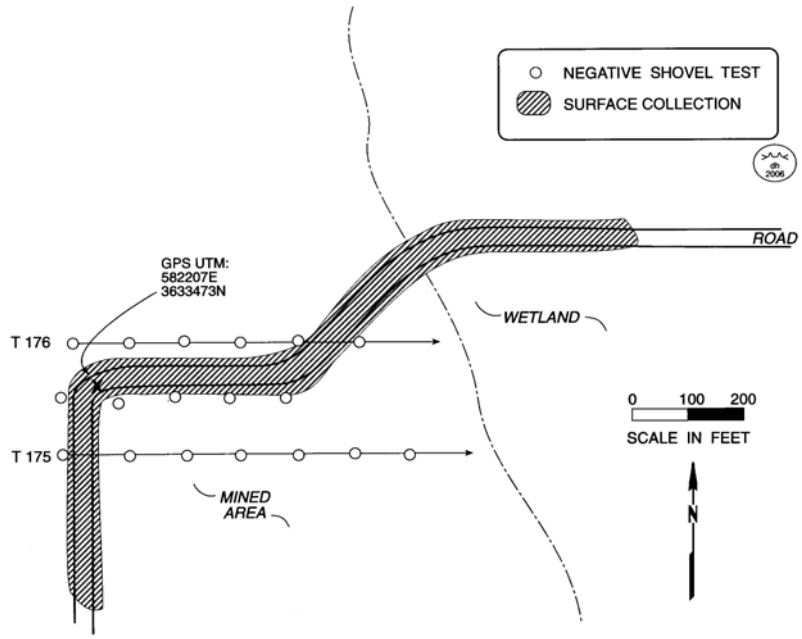


Figure 59. Sketch map and soil profile for 38CH2083.

Table 11.
Artifacts from 38CH2083

	Surface	Total
Kitchen Group		**30**
Whiteware, undecorated	1	
White porcelain, undecorated	1	
Stoneware, white saltglaze	1	
Delft, blue handpaint	1	
Lead glaze slipware	1	
Colonoware	7	
Glass, black	12	
Glass, green	4	
Glass, clear	2	
Architectural Group		**2**
Window glass	1	
Slate fragment	1	
Tobacco Group		**2**
Kaolin pipestem	1	
Kaolin pipebowl	1	
Activities Group		**1**
Nut	1	
Total		**35**

The site dimension, which includes positive shovel tests and the push piles, is about 150 feet east-west by 200 feet north-south.

While possibly once part of the nearby Bulow Mine community (it appears to be of the same time period), this site lacks the quantity (n=14 artifacts) and quality (only two basic data sets represented) of remains suitable to address significant research questions. It also seems likely that site integrity has been damaged, as evidenced by the push piles and the soil survey.

Consequently, site 38CH2082 is recommended not eligible for the National Register of Historic Places. No additional management activity is recommended pending review and concurrence by the State Historic Preservation Office.

38CH2083

Site 38CH2083 is an eighteenth to nineteenth century surface scatter (Figure 59). It is located along a road at an elevation of about 15 feet AMSL. A central UTM coordinate for the site

Figure 60. View of original ground surface (at left).

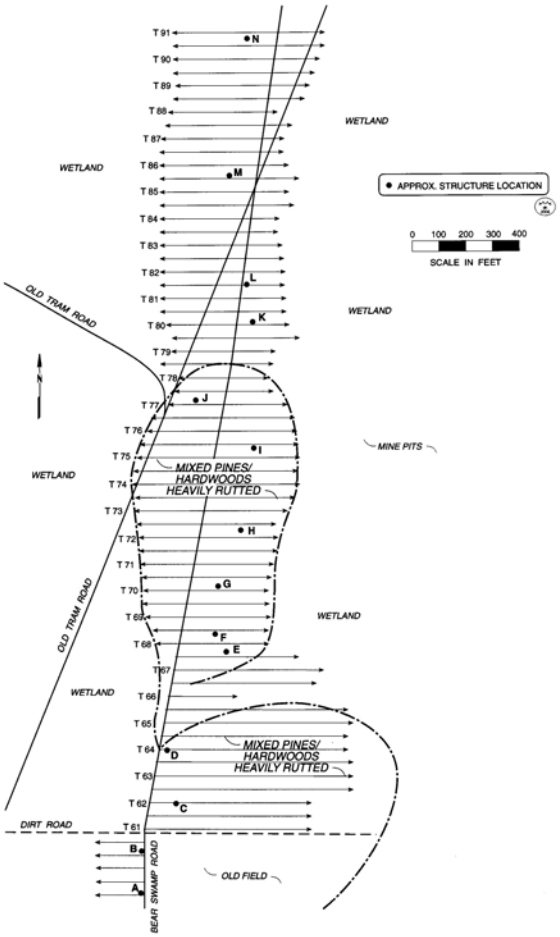


Figure 61. Sketch map of 38CH2084.

is 582207E 3633473N (NAD27 datum).

Although shovel testing was performed at 50-foot intervals, no subsurface remains were found. All of the artifacts were on the roadway (a former tram road for the Bulow Mines). The artifacts extend for about 1,300 feet along the road, which is about 20 feet in width.

The artifacts ranged in date from the eighteenth to the nineteenth century (Table 11). For example, lead glaze slipware has a MCD of 1733, while undecorated whiteware has a MCD of 1860. At least four data sets (Kitchen, Architectural, Tobacco, and Activities Groups) are represented. The 1872 plat of the property (Figure 39) shows a line of structures in this vicinity.

Regardless, the Charleston Soil Survey (Miller 1971) shows this site located in the mine pits. Our shovel tests generally produced a mottled clay at the surface, suggesting that soils had been heavily disturbed, with all of the A horizon removed. In fact, a nearby tree was observed that was still on the original ground surface, about five feet higher than the modern ground surface (Figure 60). This survey reveals that mining has entirely destroyed this

Table 12.
GPS UTMs for Individual Structures at 38CH2084

Structure	Easting	Northing
A	581681	3632632
B	581681	3632682
C	581718	3632738
D	581715	3632800
E	581776	3632914
F	581765	3632936
G	581772	3632991
H	581798	3633056
I	581807	3633151
J	581745	3633207
K	581812	3633292
L	581805	3633338
M	581785	3633482
N	581806	3633624

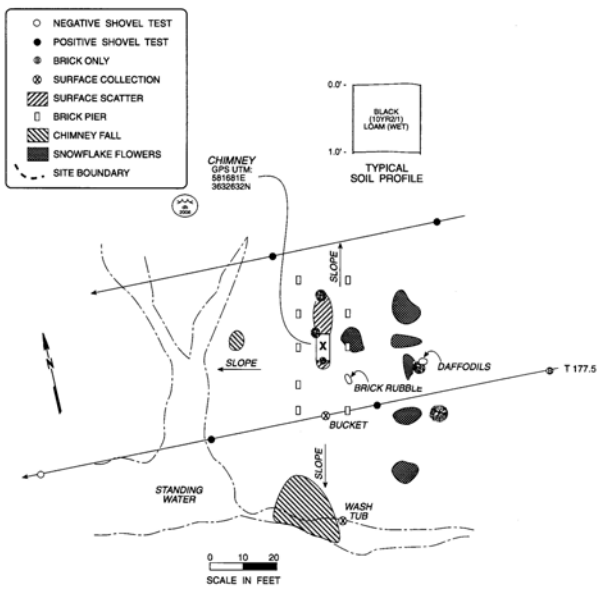


Figure 62. Sketch map of 38CH2084, Structure A.

coordinates for the structures). Figures 62-75 show sketch maps for each individual structure.

Shovel testing was originally completed at 100-foot intervals off Bear Swamp Road until positive remains were found. Close interval testing was then performed at 50-foot intervals in an effort to better isolate each structure and obtain a larger collection of artifacts. A total of 424 shovel tests were excavated in the site area with 63 (15%) positive.

The site is almost entirely wooded in a second growth of pines and hardwoods, although some areas had been thinned out for use by the hunters. At the time of the survey, the soils were wet, but generally resembled Yonges and Wadmalaw series. Yonges soils have an Ap horizon of dark grayish brown (10YR4/2) loamy fine sand to 0.8 foot over a light brownish gray (10YR6/2) loamy fine sand

area and the documented site. The remains found on the road may represent specimens from this area, or they may simply rep-resent fill from another loc-ation. Regard-less, the site lacks integrity and is unable to address any significant res-earch questions.

Because of the site's lack of integrity through phos-phate mining, 38CH2083 is recommended not eligible for the National Register. No additional management activity is recommended pending review and concurrence by the State Historic Preservation Office.

38CH2084

Site 38CH2084 is the remains of the nineteenth to twentieth century Bulow Mining village (Figure 61). It is located on level topography at an elevation of about 10 feet AMSL. At least fourteen separate structures are represented within the site (see Table 12 for a list of individual UTM

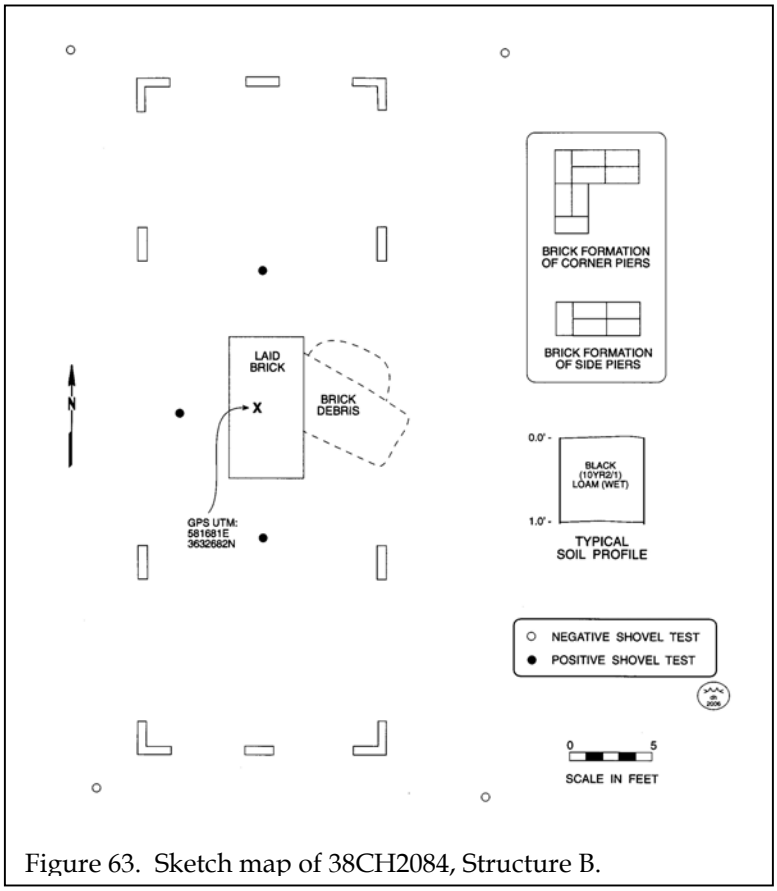


Figure 63. Sketch map of 38CH2084, Structure B.

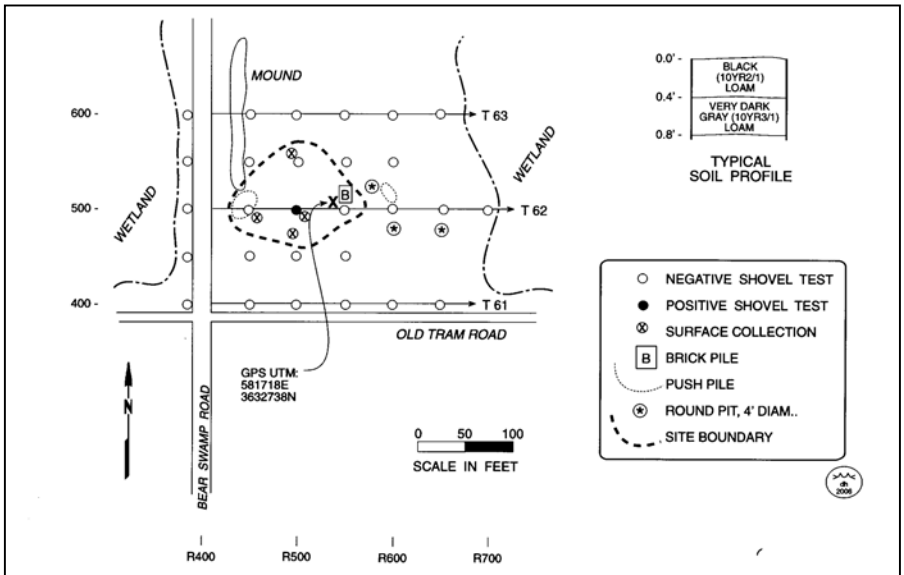


Figure 64. Sketch map of 38CH2084, Structure C.

to 1.2 foot in depth. Wadmalaw soils have an A horizon of black (10YR2/1) fine sandy loam to a depth of 0.4 foot over a very dark gray (10YR3/1) fine sand loam to a depth of 0.8 foot. Both soils are poorly drained and many shovel tests filled with water during this investigation (but were dry several weeks later).

Several historic maps show structures in the site area including the 1872 plat of the tract (see Figure 39), the 1918 Ravenel Quadrangle (Figure 8), and the 1944 Ravenels 15′ topo (Figure 10). Although sparse, temporally significant artifacts include undecorated whiteware (MCD of 1860) and blue hand painted whiteware (MCD 1848). Wire nails were popular starting in the late 1880s (Howard 1989) and a United States wheat penny was found that dates 1909.

The site produced 264 artifacts (see Table 13) in a 31 acre area (3,400 feet north-south by 400 feet east-west). The majority of these artifacts (73%) belong to the Kitchen Group. Within the Kitchen Group, only 23 artifacts were ceramic compared with 147 pieces of glass.

The Architecture Group was the second largest, composing 23% of the total. Activities Group produced 4%, while the Tobacco and Personal Groups comprised about 0.4% of the total artifact assemblage.

The site did, however, produce a large number of features, including structural remains (Figure 76) and possible wells or privies (Figure 77). At least 12 structures are documented with architectural remains. These include two standing chimneys (Structures J and L) (Figure 78), seven brick piles with good evidence of intact brick remains (Structures A, B, E, F, H, I, and K), and three more heavily disturbed or seemingly random brick piles (Structures C, M, and N). Six of these 12 structures (Stuctures A, B, E, J, L, and N) also had standing piers that provide information on structure orientation, arrangement, and size. Two additional structures are

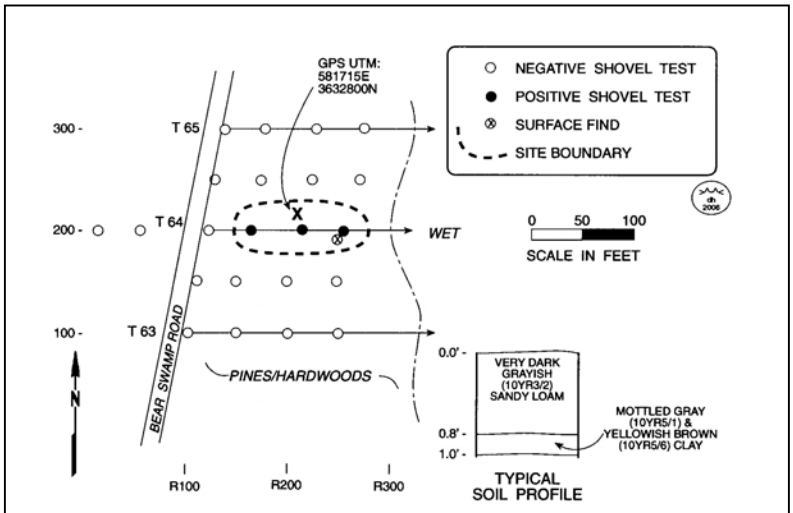


Figure 65. Sketch map of 38CH2084, Structure D.

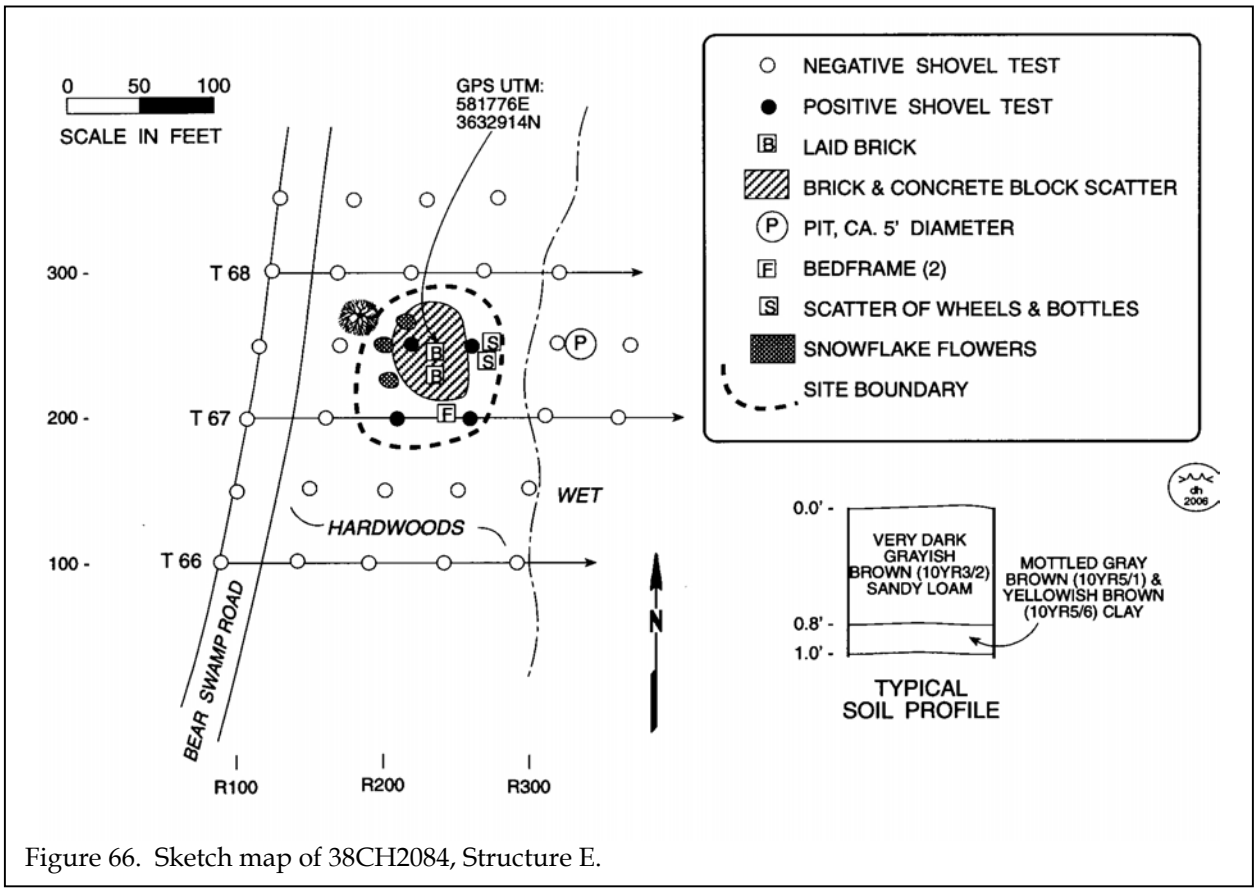


Figure 66. Sketch map of 38CH2084, Structure E.

documented only by artifacts.

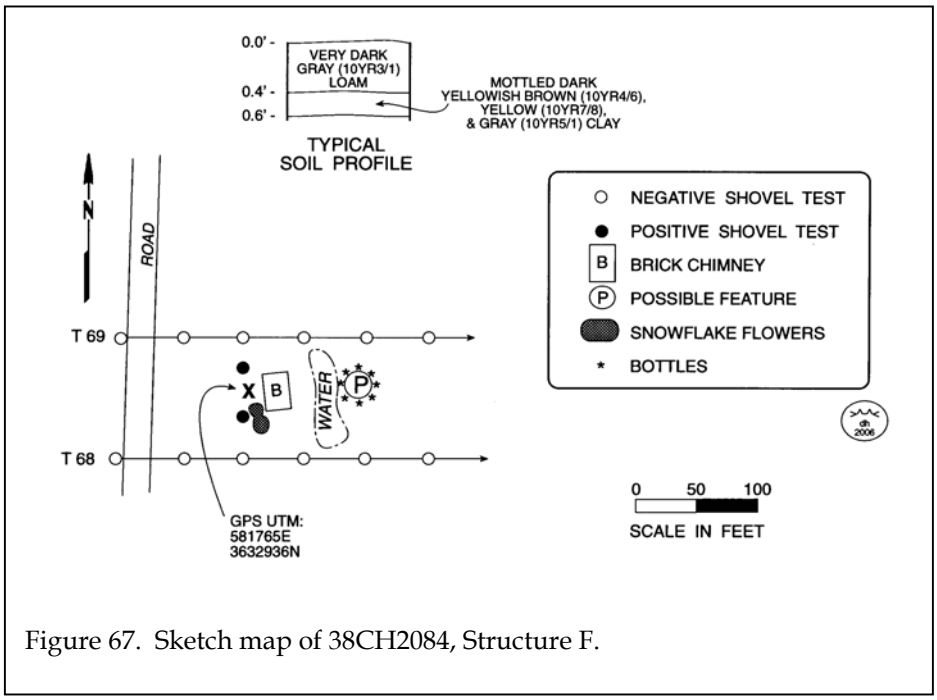


Figure 67. Sketch map of 38CH2084, Structure F.

From the 14 separate structures, ten round pits ranging from about 4 feet to 20 feet in diameter, were identified (from Structures C, E, F, H, L, and N). All of these were filled with water at the time of the survey, so no testing was performed inside to determine the function of the pits. Only two of the structures (Structures D and G) contained no identifiable surface features.

As with 38CH2081, almost every structure contained the snowflake flowers (see Figure 76) (*Leucojum*

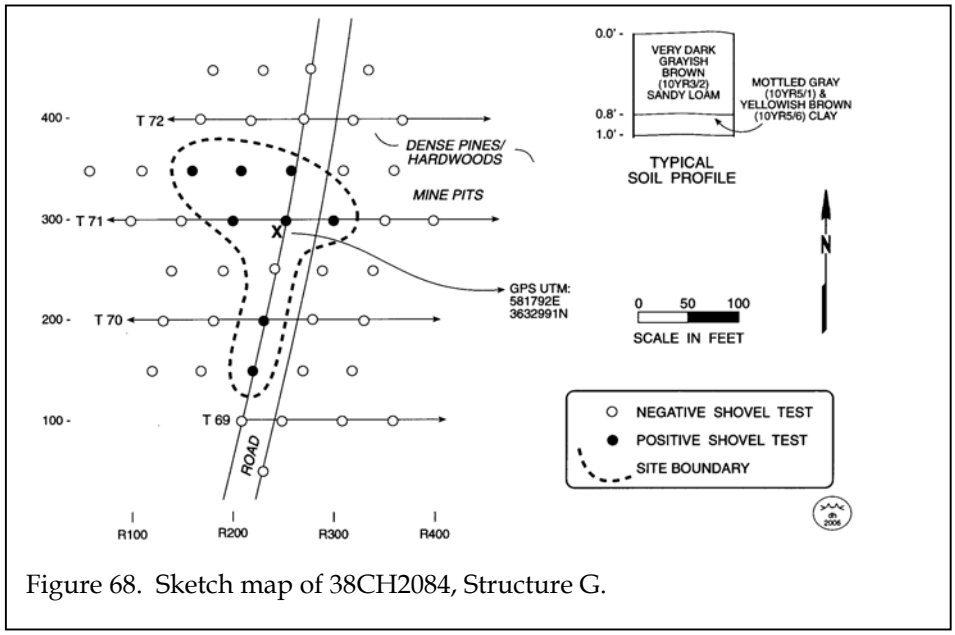


Figure 68. Sketch map of 38CH2084, Structure G.

aestivum), which were in bloom at the time of the survey. All of these bulbs appear to be in the "front yard" of the structures (i.e., the yard area facing the main road), which seems common at old home sites.

Many of the individual structure locations also contained a surface scatter of artifacts (Figure 79). While glass bottles were the most common, carriage wheels, wheelbarrows (which were common tools in phosphate works) enamelware kitchen items, and tin buckets were also observed. It was also interesting to note that each structure appeared to retain a different personality – the scatters at each structure generally produced different artifacts.

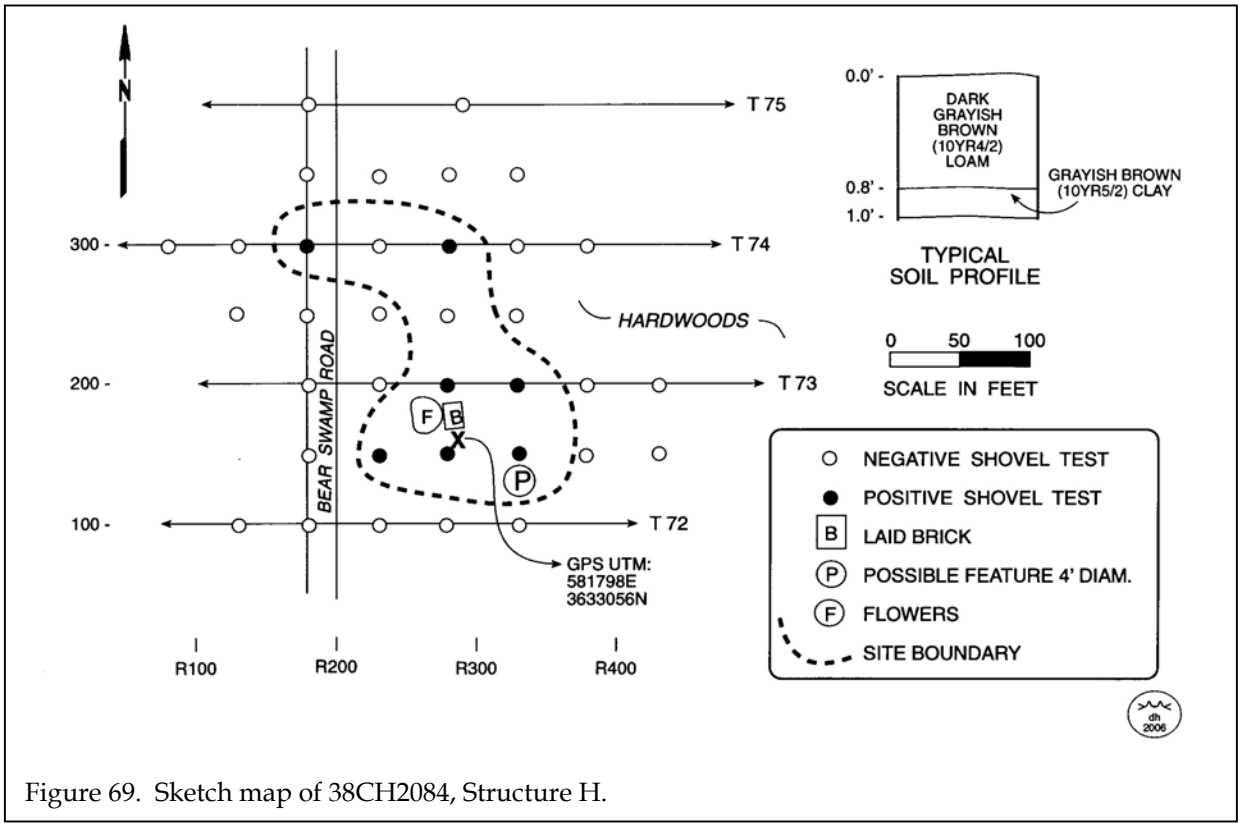


Figure 69. Sketch map of 38CH2084, Structure H.

In addition, the two chimneys, while producing a similar range of artifacts, were each very different. One of the standing chimneys (Structure L) had a "home-made" flue in the side (Figure 80) along with the re-use of a rail for support of the mantle (Figure 81). This chimney also appeared to be of a "duplex" type nature – it was located in the middle of the structure with both sides open. The other chimney (Structure J) evidences several episodes of building or repair (Figure 82). This

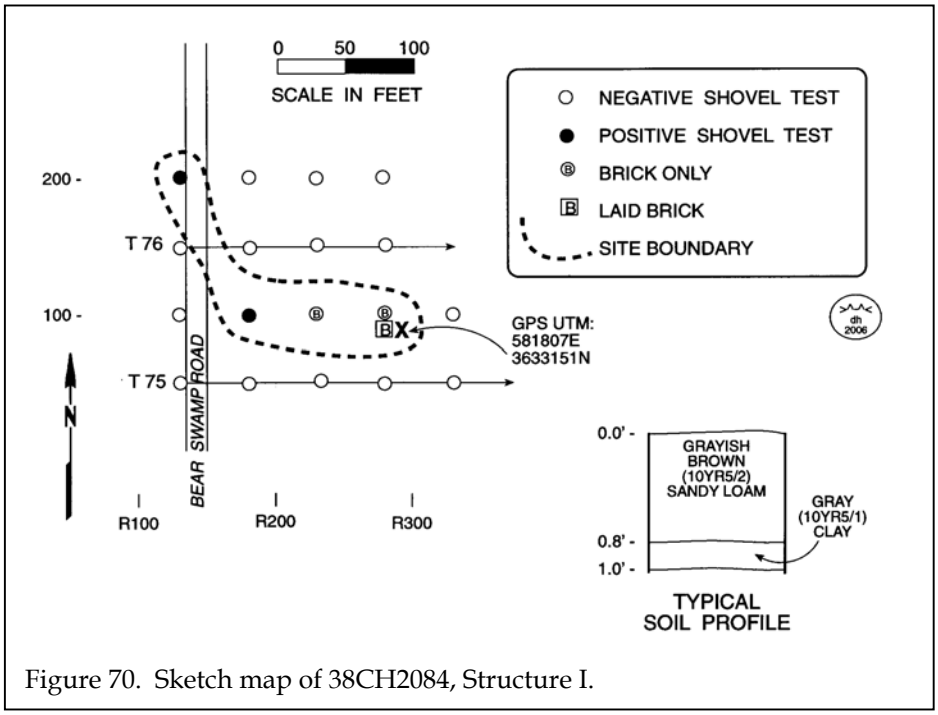


Figure 70. Sketch map of 38CH2084, Structure I.

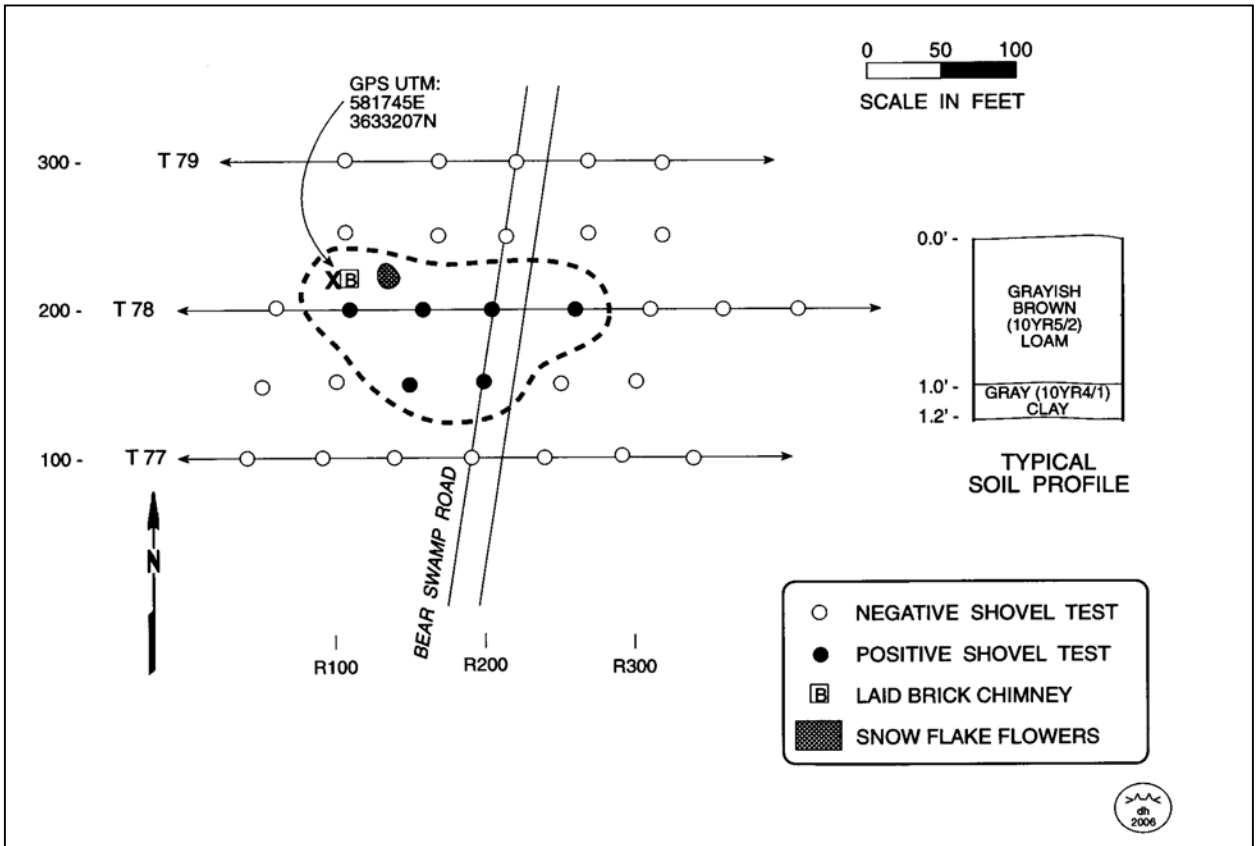


Figure 71. Sketch map of 38CH2084, Structure J.

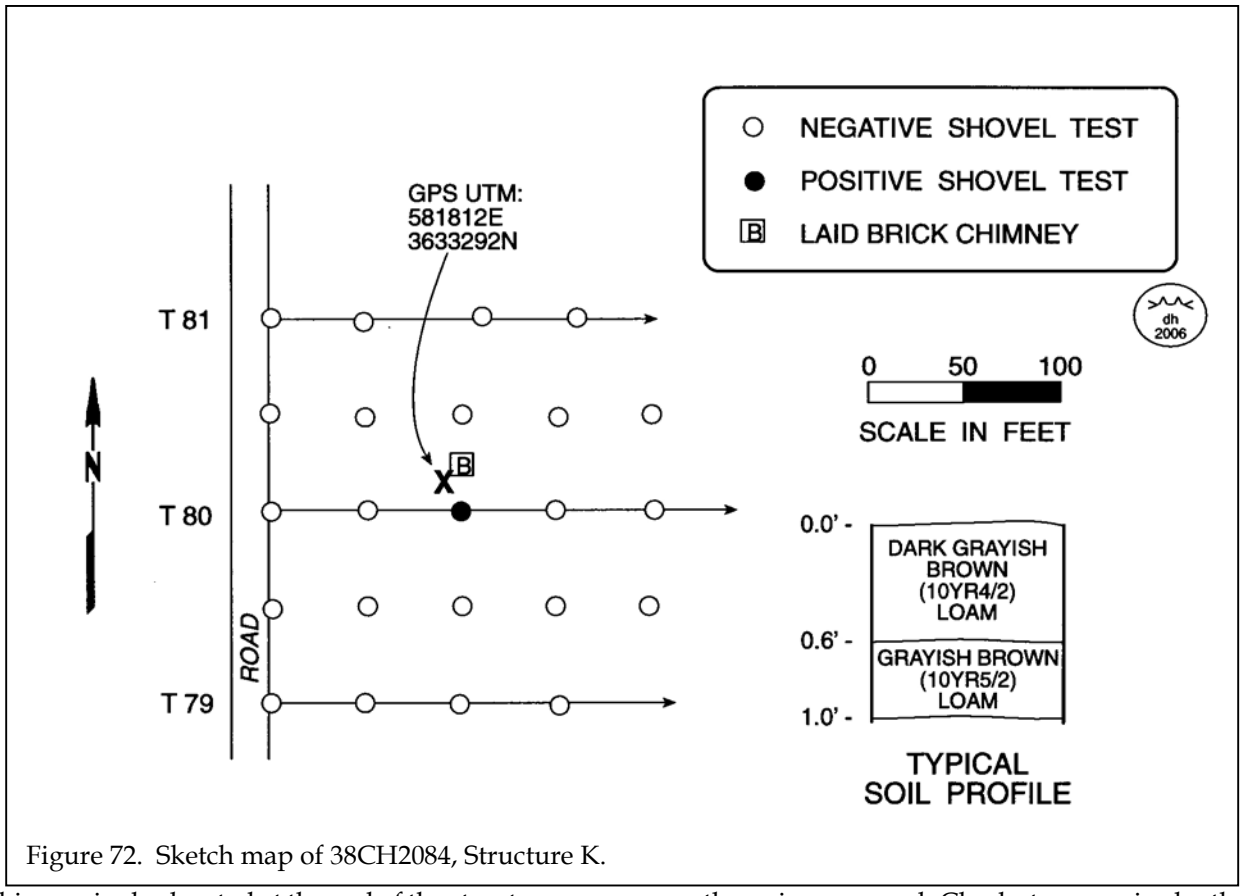
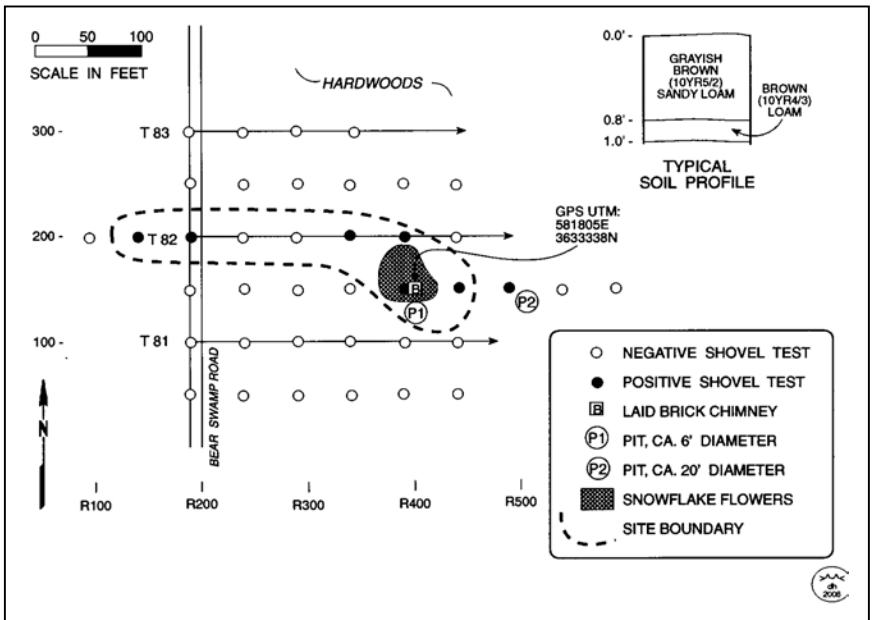


Figure 72. Sketch map of 38CH2084, Structure K.

chimney is also located at the end of the structure, being open on only one side (possibly a single family home). Some of the repairs may relate to the 1886 Charleston earthquake. Dutton (1889:308) observed at "Bradley's Phosphate Works . . . a considerable number of wooden buildings in the vicinity with brick chimneys were universally injured; the chimneys being severely cracked, broken off, and in some instances collapsed."

This site provides an excellent opportunity to study a community of underrepresented, virtually invisible, people. While several studies have been performed on the mines around Charleston, no in-depth



Structure 73. Sketch map of 38CH2085, Structure L.

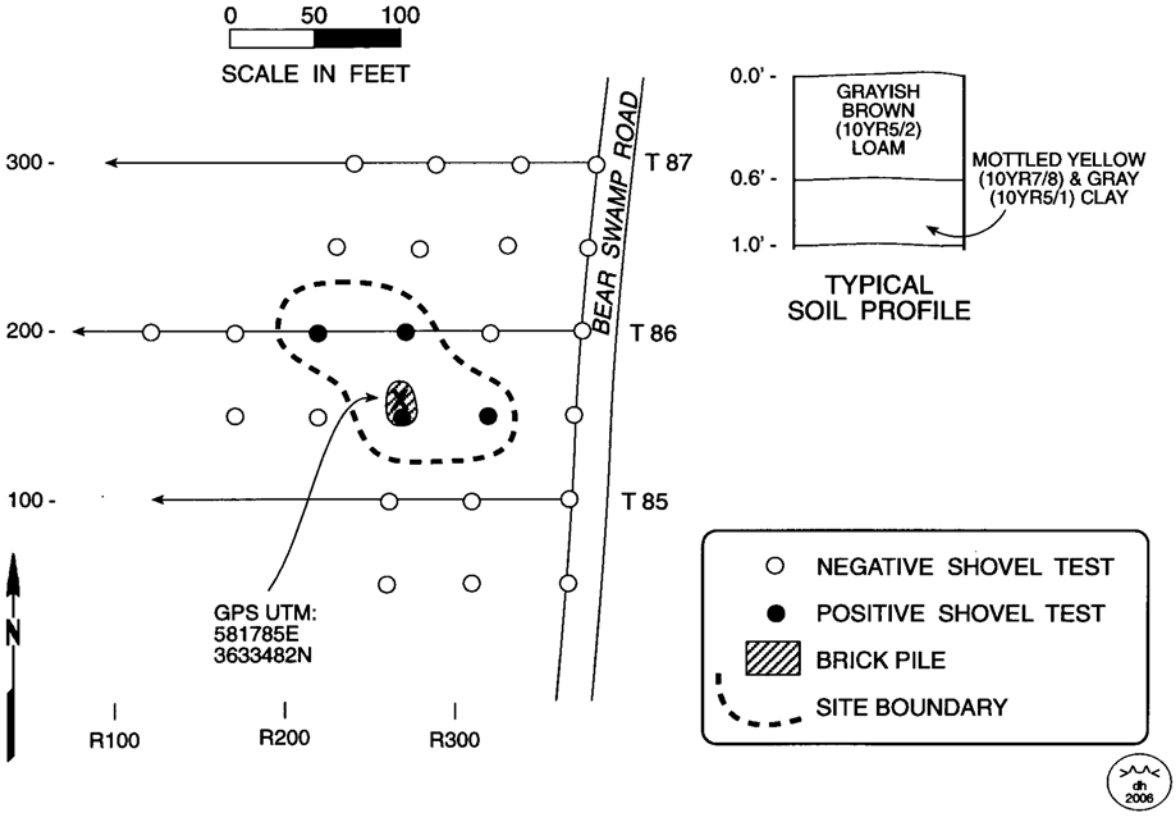


Figure 74. Sketch map of 38CH2084, Structure M.

research has been found on the actual workers. As with 38CH2081, at least three critical topics may be examined at 38CH2084, including:

- identification of assemblages and patterns thought to be associated with mine or factory workers for comparison and contrast to those from slavery and agricultural tenancy;
- documentation of worker's cabins as part of an effort to determine the nature of construction and distinguish between the "shanties" and more substantial housing – as well as to compare and contrast

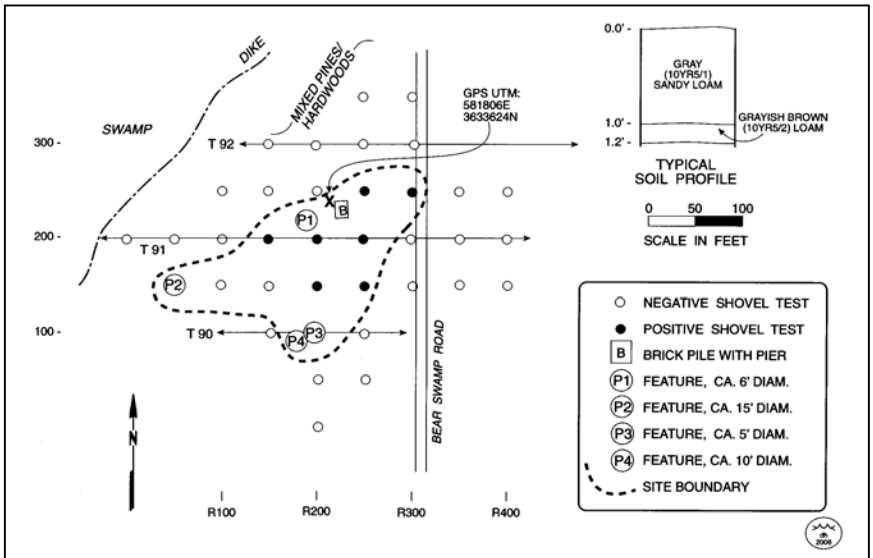


Figure 75. Sketch map of 38CH2084, Structure N.

Table 13.
Artifacts from 38CH2084

	Structure A						Structure B				Structure C			Structure D			Structure E				Structure F			Structure G										Structure H									
	T177 ST1.5	T177 ST2	T177.5 ST1.5	T177.5 ST2	Surface	T149 ST1.5	N of Chimney	S of Chimney	W of Chimney	300R450	300R500	350R500	200R160	200R210	200R260	200R210	200R260	150R220	250R270	Surface	T68.5	1T NE	1PSW	Surface	150R220	200R250	300R250	300R300	300R200	350R260	350R210	350R160	150R250	150R350	150R380	200R280	200R350	300R180	300R280	Surface
Kitchen Group																																									
Faunal material								10	2													1																			
Whiteware, undecorated				2			1	3								1																	2							6
Whiteware, blue handpaint																																									
White porcelain								1										1			1			1																	
Stoneware, Bristol glaze																					1																				
Glass, clear			1	1	1		1	13	2						2							2				2			1	2	2		1	2		1		1		
Glass, aqua								1													1		1																	
Glass, blue																																									
Glass, manganese	1	1			1					6			1								1			1	1								4							
Glass, brown														1							1			1								2					1		
Glass, light blue																		1																						
Glass, light green																										2							1							1
Glass, milk																																								1
Glass, milk yellow																1																								
Glass, whole bottle					2							1							1		2		3																	1
Glass, black																																								
Glass, melted																																								
Can fragment		5																																					
Spoon fragment																																								
Architecture Group																																								
Nail, UID fragment							2		4				1						3		2	1				2	1		1				5		1	1				
Nail, wire cut		1																																	1					
Window glass									2																			2		1										
Hinge fragment																																								
Slate																																								
Tobacco Group																																								
Kaolin pipebowl				1																																				
Personal Group																																								
Coin																																								
Activities Group																																								
UID iron						1					1								1																					
Chain link																			3																					
Coal																										1														
Iron washer																																								1
Total																																								

	Structure I		Structure J						Structure L								Structure M			Structure N								Total
	100R100	200R130	150R200	150R150	200R210	200R260	200R160	200R110	Surface	T80 ST2	150R390	150R440	150R490	200R140	200R190	200R340	200R390	Surface	150R270	150R320	300R220	200R270	150R20	150R250	200R150	200R200	200R350	350R250	350R300	Surface	
Kitchen Group																															192
Faunal material										1																					
Whiteware, undecorated																							1					1		1	
Whiteware, blue handpaint		1																													
White porcelain																															
Stoneware, Bristol glaze																															
Glass, clear	2	1			1	1		5				1		1	1		1		2		1	1	2		5	8	5	1		
Glass, aqua							1					1						1						1							
Glass, blue			1																												
Glass, manganese																		1		1											
Glass, brown																															
Glass, light blue																															
Glass, light green																															
Glass, milk																												1			
Glass, milk yellow																															
Glass, whole bottle																		7													
Glass, black																		14													
Glass, melted																			1									1			
Can fragment																		1													
Spoon fragment																										1					
Architecture Group																															60
Nail, UID fragment			1	2			2				2	3	3			2			3				1			3	2				
Nail, wire cut																															
Window glass																											1				
Hinge fragment										1																					
Slate									3																						
Tobacco Group																															1
Kaolin pipebowl																															
Personal Group																															1
Coin																			1												
Activities Group																															10
UID iron				1																		1									
Chain link																															
Coal																															
Iron washer																															
Total																															264

Figure 76. View of structure remains at 38CH2084.

Figure 77. View of a pit feature at 38CH2084.


Figure 78. View of a chimney from 38CH2084.

The artifact assemblage reveals a range of artifact categories. The sites present architectural remains as well as yard features. There are undisturbed yard assemblages. A range of data sets are present at the sites, all with excellent integrity, suitable to addressing these questions.

We recommend site 38CH2084 as potentially eligible for the National Register for its information potential. Further assessment should involve 20-foot close interval testing on at least seven of 14 structures, allowing a variety to be examined. This additional information should help refine site boundaries, further expand artifact collections, and better document site integrity.

38CH2085

Site 38CH2085 (Figure 83) consists of a series of at least three late nineteenth century structure remains located on the edge of the Bulow Mine pits at an elevation of about 10 feet AMSL. Table 14 gives the UTM coordinates for each separate brick pile.

The area is dominated by an east-west road. To the north of the road are dense woods.

phosphate or fertilizer housing with that found in slavery;

- ❖ research to document activities specific to the mines, including such divergent topics as ownership/ possession of tools, use of a commissary, and heavy drinking or gambling that might support the "rowdiness" said to be typical of the camps.


Figure 79. View of surface scatter at 38CH2084.

Figure 80. View of a flue at 38CH2084.

Figure 81. View of a rail line as a mantle support at 38CH2084.

Figure 82. View of different building episodes at a chimney in 38CH2084.

To the south is what appears to be an open field.

According to the Charleston Soil Survey (Miller 1971), the area both to the north and south of the road is mine pits. Our field investigation revealed that to the south of the road the field was actually heavily disturbed, with water-filled pits and much logging debris. About 40 feet north of the road there were large mine pits and a rolling topography characteristic of phosphate mining. It was only immediately adjacent to the north side of the road that there was a strip unaffected by mining – and it was in this strip that the preserved portions of 38CH2085 were encountered.

Shovel testing was originally performed at 50-foot intervals, since at least one brick pile was observed from the road on the north side. A total of 33 shovel tests were excavated with six (18%) positive. An additional two contained only brick.

The soils south of the road generally produced a dark grayish brown (10YR4/2) loamy sand to 0.3 foot in depth over a mottled clay. To the north of the road, in the undisturbed site area, we found an A horizon of very dark brown(10YR2/2) sandy loam to 0.8 foot in depth over a gray (10YR5/1) sandy loam to a depth of 1.2 feet. It appears that in the best preserved areas to the south of road – where only a few artifacts were encountered – there has still been the loss of at least 1.7 feet of soil.

The artifacts from this site appear to have a terminal date in the twentieth century. For example, the undecorated whiteware has a MCD of 1860 (although this may be misleading since whiteware is still being produced today). An Indian Head penny dating 1867 was recovered. In addition, during the November 2004 Cultural Resource Assessment (CRA) of the site, an

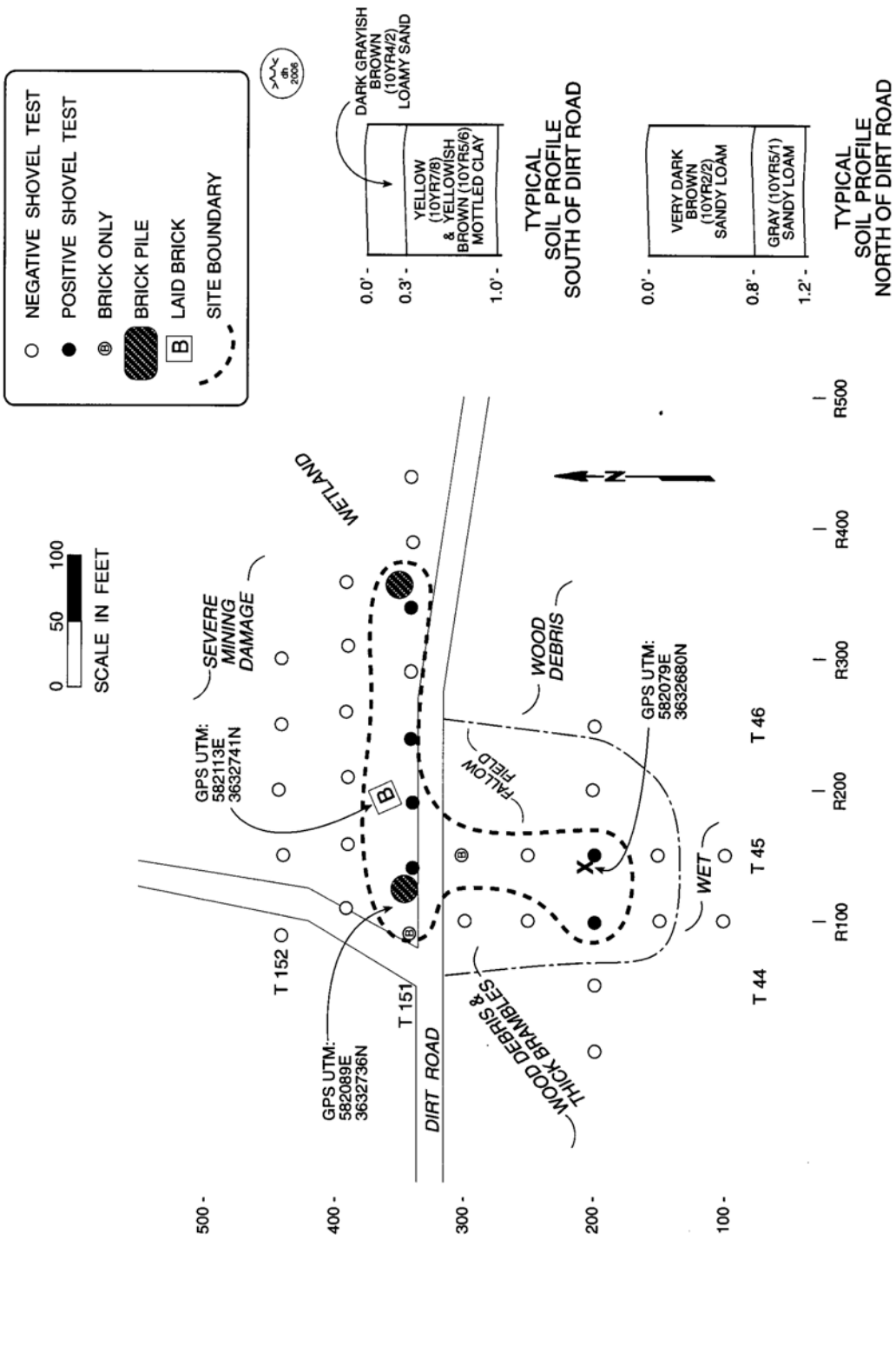


Figure 83. Sketch map and soil profile for 38CH2085.

informant said he had collected several dispensary bottles (the South Carolina Dispensary operated between 1891 and 1905).

Table 14.
GPS UTMs for each structure at 38CH2085

Structure	Easting	Northing
A	582089	3632736
B	582113	3632741
C	582126	3632717

The portion of the site north of the road produced the remains of at least three structures, revealed by two brick piles and one laid brick pile. The southern portion of the site produced only nails, which may be the remains of a barn or other utilitarian structure. The 1872 plat of the property (see Figure 39) shows this southern portion of the site to be in a field and we found no other historic map that shows a structure in this area.

produced more Clothing and Personal Group items, which may point to higher status individuals than found in the central village.

While the southern portion of this site (south of the road) lacks integrity through mining and subsequent logging, the three structures north of the road have eluded much of the destruction. The northern portion of the site has the potential to address research questions of status and diet and in turn, may be compared or contrasted with the other mining groups on the property. We may also be able to identify architectural details and thereby compare these structures to those in the main settlement area at 38CH2084.

Table 15.
Artifacts from 38CH2085

	Structure A		Structure B					Total
	200R100	200R150	100R160	100R210	100R260	100R360	Surface	
Kitchen Group								**12**
Faunal material				1				
Whiteware, undecorated				2	1			
Glass, aqua				1	2			
Glass, clear				1	3			
Glass, black					1			
Architectural Group								**10**
Nail, UID fragment	1	1	1	2	2	2		
Window glass					1			
Clothing Group								**2**
Button				1		1		
Personal Group								**1**
Coin							1	
Total								**25**

Site 38CH2085, which has a site area of about 250 feet east-west by 200 feet north-south, produced several different data sets including Kitchen (48%), Architecture (40%), Clothing (8%), and Personal (4%) Groups (Table 15).

While possibly related to the Bulow Mining community, it is unknown why these structures are separate from the central portion of the mining community at 38CH2084. This site

We recommend site 38CH2085 as potentially eligible for the National Register for its information potential. No construction activities should take place in this area until additional testing has taken place and an eligibility determination has been made. The additional investigations necessary to fully assess this site will involve close-interval (20-foot) testing of the

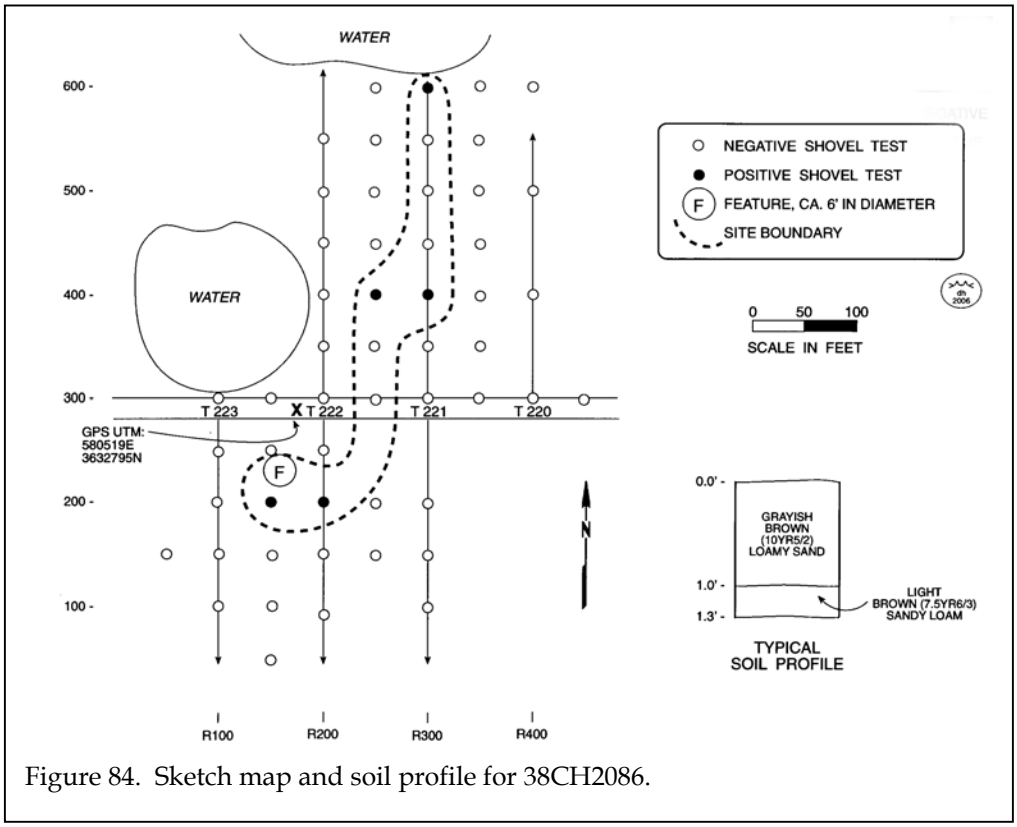


Figure 84. Sketch map and soil profile for 38CH2086.

three structures north of the road, combined with the excavation of at least two 5-foot units in different structural areas, based on the close interval testing. No additional investigations appear necessary south of the road.

38CH2086

Site 38CH2086 (Figure 84) is an eighteenth to nineteenth century subsurface domestic scatter. It is located on the edge of Bear Swamp at an elevation of about 8 feet AMSL. A central GPS UTM is 580519E 3632795N (NAD27 datum).

The site, which is located in a mixed pine and hardwood forest, was shovel tested at 50-foot intervals. A total of 50 shovel tests were excavated with five (10%) positive. Shovel tests generally resembled Yonges sandy loam, which has an Ap horizon of dark grayish brown (10YR4/2) loamy fine sand to 0.8 foot over a light brownish gray (10YR6/2) loamy fine sand to 1.2 foot in depth. Some of the tests produced a subsurface layer closer to a light brown (7.5YR6/3) sandy loam.

The five positive tests produced only ten remains (Table 16). These artifacts, however, have a MCD of 1838, which is considered reasonably accurate given the number of ceramics present. We also observed a pit at the site, possibly a well or privy, however, no testing was performed in the pit due to the high water table. No artifacts, however, were found around the pit.

Table 16.
Artifacts from 38CH2086

	400R300	600R300	400R250	200R150	200R200	Total
tchen Group						**6**
Creamware, undecorated	1					
Pearlware, blue edge				1		
Whiteware, undecorated			2			
Whiteware, annular	1					
Whiteware, blue transfer print		1				
Architecture Group						**4**
Nail, UID fragment	1		2		1	
Total						**10**

This structure does not appear on any historic maps, which may mean that it predates

the Bulow Mine. However, the site, which measures about 400 feet north-south by 150 feet east-west, has been heavily impacted by both mining and subsequent logging. In addition, only two data sets (Kitchen and Architecture Groups) along with the possible feature are present.

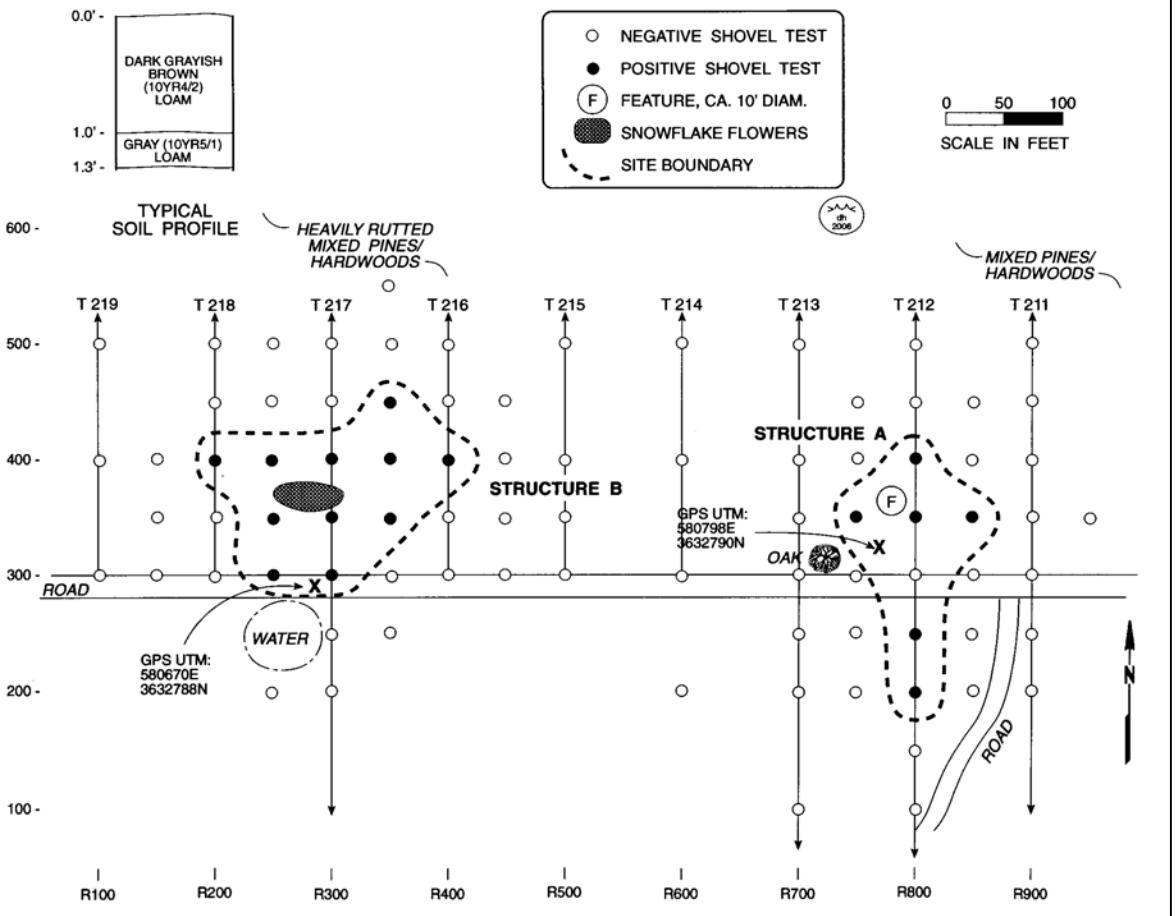


Figure 85. Sketch map and soil profile for 38CH2087.

Given the low site integrity and very sparse assemblage, we recommend site 38CH2086 as not eligible for the National Register of Historic Places. We believe that the most significant data from the site – its location – has already been recovered. No additional management activity is recommended pending review and concurrence by the State Historic Preservation Office.

38CH2087

Site 38CH2087 (Figure 85) is the remains of two structures dating from the nineteenth to twentieth century. The site is on the edge of Bear Swamp at an elevation of about 8 feet AMSL. The area has a second growth of pines and hardwoods, although a large oak (representative of its pre-logging setting) is present along the road within the site area.

Shovel tests were originally completed at 100-foot intervals until a positive shovel test was encountered at Transect 212 Shovel Test 2 (400R800). Close interval testing was then performed at 50-foot intervals until two consecutive negative tests were encountered. A total of 81 shovel tests were excavated with 17

Table 17.
Artifacts from 38CH2087

	Structure A							Structure B											Total
	350R850	350R800	400R800	250R800	200R800	350R750		400R400	350R350	400R350	450R350	300R300	350R300	400R300	300R250	350R250	400R250	400R200	
Kitchen Group																			**22**
Whiteware, undecorated		1							1							1			
Glass, clear	1							1						1			1		
Glass, brown	1																		
Glass, light green	1																		
Glass, manganese			1			1				5					1		1	1	
Glass, aqua					1					1								1	
Architecture Group																			**17**
Nail, UID fragment	2	4	2	4					4	1	2	1	4		3				
Total																			**39**

(21%) positive, revealing approximate site dimensions of 600 feet east-west by 200 feet north-south. Within these boundaries, however, we identified two distinct concentrations of artifacts, suggestive perhaps of two structures (although no above-grade structural remains were present).

Soil profiles resembled Yonges soils, which have an Ap horizon of dark grayish brown (10YR4/2) loamy fine sand to 0.8 foot over a light brownish gray (10YR6/2) loamy fine sand to 1.2 foot in depth. Some of the subsoil within the site area was a gray (10YR5/1) loam.

Although sparse, the artifacts appear to date from the same time as the main mining settlement at 38CH2084. It is also similar in the fact that glass is far more abundant than ceramics (Table 17). This site, however, only produced two artifactual data sets (Kitchen and Architecture Groups).

One feature, a pit measuring about 10 feet in diameter, was observed at the site. Like many of the previous features, no excavation was performed due to the standing water in the pit.

While this site did not produce a large quantity or variety of artifacts, the information potential is high when it is compared or contrasted to the main settlement at 38CH2084. In addition, while the structures at 38CH2087 are shown on the 1918 Ravenels topographic map (Figure 8) and the 1929 *Sanitary and Drainage Commission Map* (Figure 9), they are not shown on the 1944 Ravenels topographic map (Figure 10), suggesting that they had been abandoned by that time.

We recommend this site as potentially eligible for inclusion on the National Register of Historic Places pending additional close-interval testing. This additional testing should be structured to assist in better boundary delineation, the collection of a more representative assemblage, and further comparison with the main settlement to determine if there are substantive differences that warrant additional investigation.

38CH2088

Site 38CH2088 (Figure 86) is an eighteenth to possibly early nineteenth century subsurface scatter on the edge of Bear Swamp at an elevation of about 10 feet AMSL. A central UTM coordinate is 579843E 3632319N (NAD27 datum).

The site was originally identified through shovel testing at 100-foot intervals with Transect 226, Shovel test 3 (210R100) positive. Close interval testing was performed at 50-foot intervals to better identify the site boundaries, which measure about 500 feet north-south by 200 feet east-west. A total of 124 shovel tests were excavated with 18 (15%) positive. An additional three shovel tests produced only brick.

Test profiles resemble Yonges fine sandy loam, which has an Ap horizon of dark grayish brown (10YR4/2) loamy fine sand to 0.8 foot over a light brownish gray (10YR6/2) loamy fine sand to 1.2 foot in depth. However, many of the tests produced a grayish brown (10YR5/2) loamy sand to 1.2 feet in depth over a light brown (7.5YR6/3) loamy sand to 1.5 feet in depth. The meaning of this profile – which does not appear disturbed – is

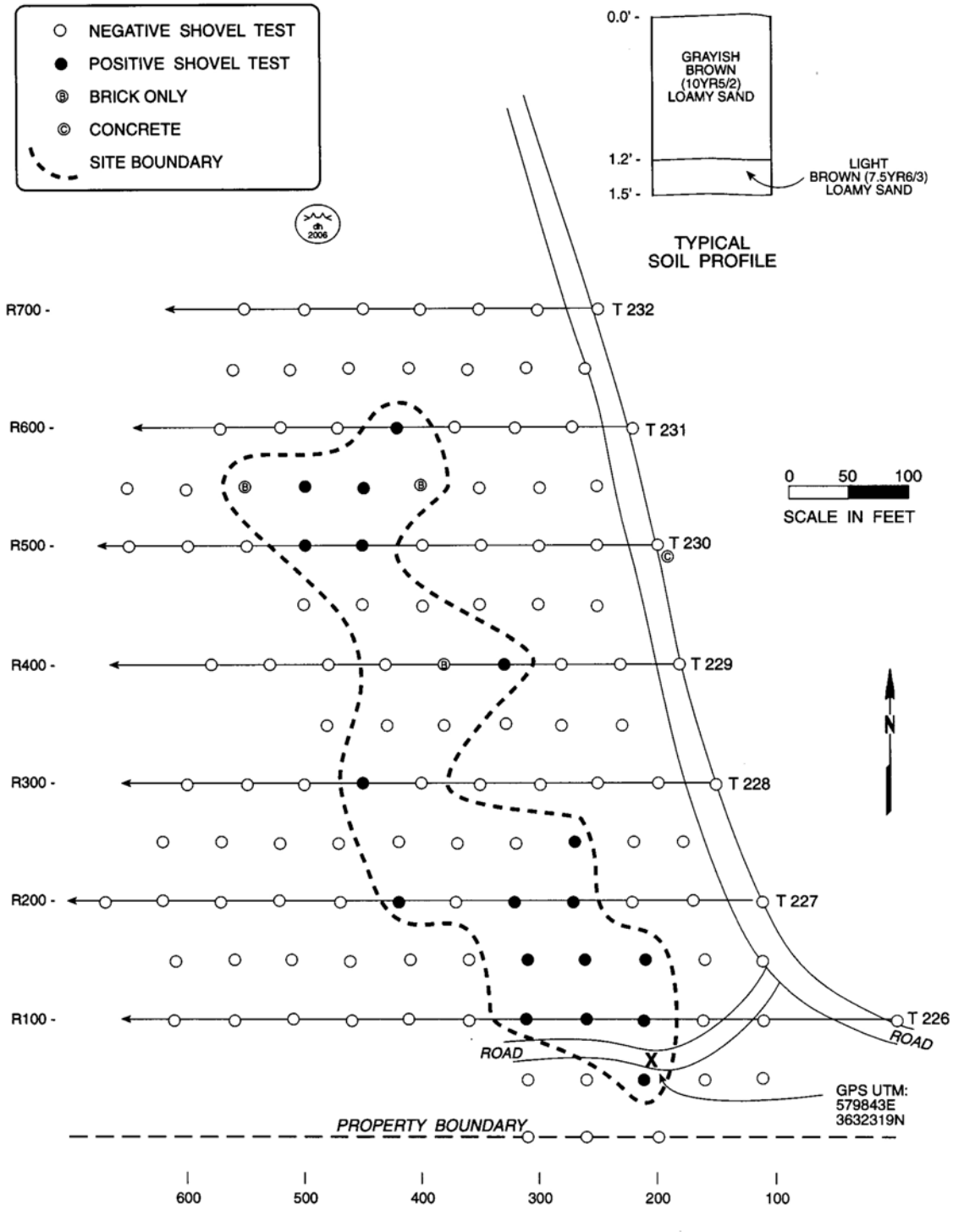


Figure 86. Sketch map and soil profile for 38CH2088.

Table 18.
Artifacts from 38CH2088

	210R50	210R100	260R100	310R100	210R150	260R150	310R150	270R200	320R200	420R200	270R250	450R300	330R400	450R500	500R500	450R550	500R550	420R600	Total
Kitchen Group																			**40**
Creamware, undecorated		1	1																
Pearlware, blue edge													1						
Red earthenware, black lead glaze		1																	
Lead glaze slipware						1													
Colonoware	1		3			4			1	1	1	1		5			1	1	
Glass, black	2	1	2	1		2	1	1							1	1	2		
Glass, aqua																	1		
Glass, clear																	1		
Architecture Group																			**3**
Nail, UID fragment			1												2				
Tobacco Group																			**1**
Kaolin pipebowl					1														
Clothing Group																			**1**
Button		1																	
Total																			**45**

uncertain.

This survey collected historic artifacts from the eighteenth century representing archaeological data sets including Kitchen (89%), Architecture (7%), Tobacco (2%), and Clothing (2%) groups (Table 18). The artifacts were small in size and each test generally produced only a few specimens.

Recovered artifacts include undecorated creamware, which has a MCD of 1791, and lead glaze slipware, which has a MCD of 1733. The most recent ceramic is blue edge pearlware, which ranges in date from 1780 to 1820. Colono ware, thought to be an eighteen century slave-made pottery, was common at the site, accounting for nearly half of the Kitchen Group and nearly 80% of the ceramics. "Black" glass, which was common at the site, was also prevalent during the eighteenth century, although it was produced into the nineteenth centuries (Jones and Sullivan 1985:14). A MCD for the entire site is 1780.

Based on the limited data (primarily the quantity of Colono pottery), it is likely that this site represents a slave settlement associated with the John or Charles Drayton ownership of the parcel – although additional investigation is necessary to more conclusively establish both the function of the site and its occupation range. While no features were initially seen, it has been our experience that features may still remain relatively intact in the subsurface soil. Such an example is the discovery of a Colonial structure while strip testing at Youghal Plantation (Trinkley et al. 2006).

A similar settlement (38DR250) has also been found in nearby Dorchester County (Trinkley and Southerland 2006). Site 38DR250 dates to the same time period and contains similar percentages of data sets including Kitchen (82%), Architecture (9%), Tobacco (5%), and instead of Clothing, contains an Activities Group (5%). The estimated site dimension is also similar, resulting in an area 200 feet east-west by 450 north-south.

While site 38CH2088 has been affected by logging, the subsurface artifacts appear to retain good integrity, considering the depth of some tests extend to 1.5 feet. This provides an opportunity to identify intact features, suggesting that the site has the ability to address research questions about a possible Colonial slave settlement.

For these reasons, 38CH2088 is potentially eligible for the National Register of Historic Places. Additional testing, consisting of 20-foot interval testing combined with several 5-foot units, is necessary to better examine the artifact content and evaluate site integrity. Given the rich historical accounts left by the Drayton family, it is possible that further documentary research would help resolve some questions concerning this site, although such research might best be conducted only if the site is found, based on additional testing, to be eligible for inclusion on the National Register.

38CH2089

Site 38CH2089 (Figure 87) is an eighteenth

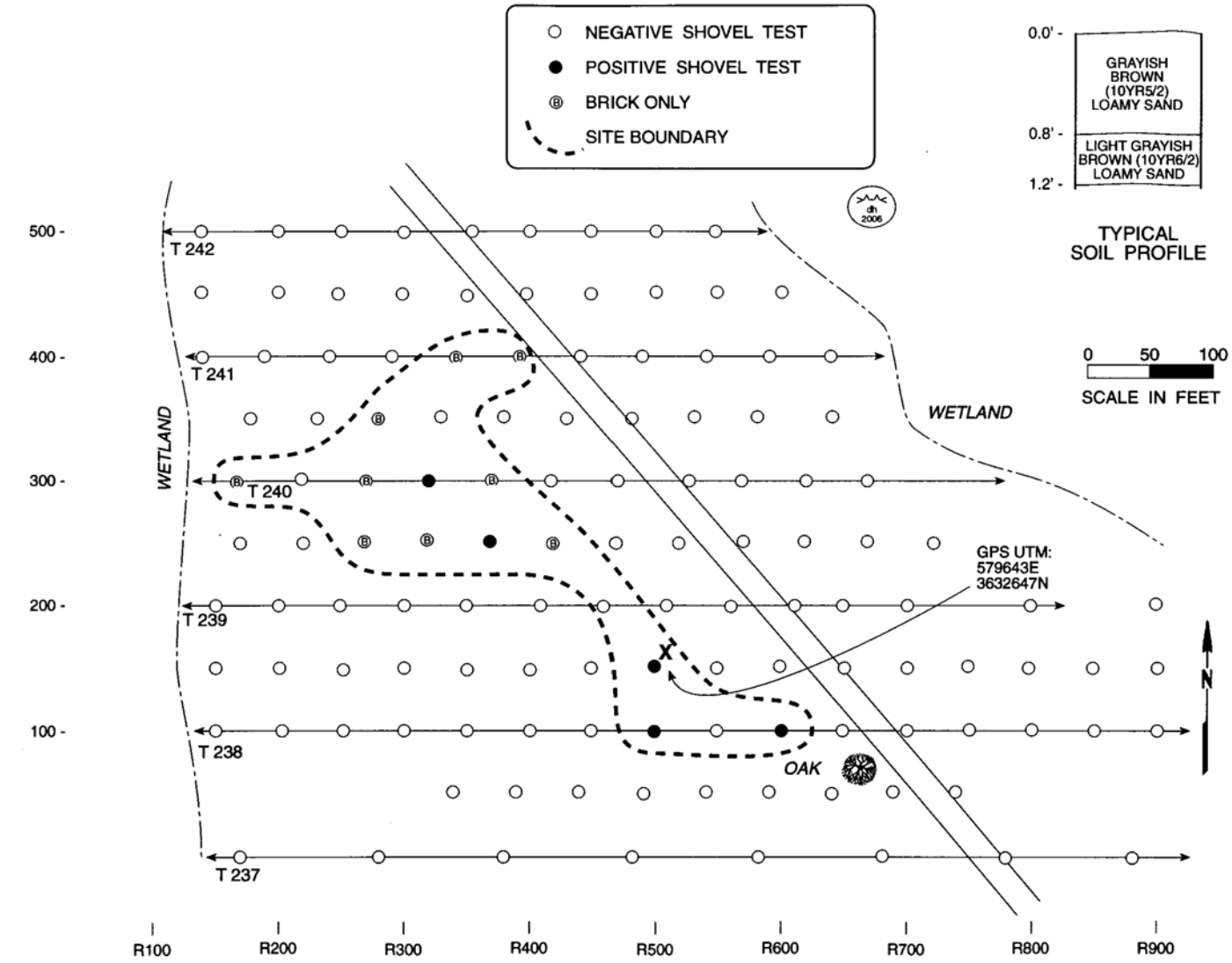


Figure 87. Sketch map and soil profile for 38CH2089.

Table 19.
Artifacts from 38CH2089

	100R600	100R500	150R500	250R370	300R320	Total
Kitchen Group						**9**
Colonoware		1	3	1	1	
Glass, black			1	1	1	
Tobacco Group						**1**
Kaolin pipestem	1					
Total						**10**

century structure located on the edge of Bear Swamp at an elevation of about 10 feet AMSL. A central UTM coordinate for the site is 579643E 3632647N (NAD27 datum).

The site was found through shovel testing at the originally proposed 100-foot intervals with Transect 238, Shovel test 2 (100R600) positive. Close interval testing was performed at 50-foot intervals until two consecutive negative tests were encountered. A total of 114 shovel tests were excavated with five (4%) positive. An additional nine tests produce only brick.

Soil profiles were similar to Yonges soils, which have an Ap horizon of dark grayish brown (10YR4/2) loamy fine sand to 0.8 foot over a light brownish gray (10YR6/2) loamy fine sand to 1.2 foot in depth. An estimated site dimension is 400 feet north-south by 400 feet east-west.

Only ten artifacts (Table 19) were recovered from the site representing the Kitchen (90%) and the Tobacco (10%) groups (although the Architecture Group is also represented given the amount of brick observed at the site, these remains are typically not included in pattern analysis). While the sample size is small for an accurate date, both Colono ware and "black" glass were common in the eighteenth century.

Given the proximity to 38CH2088, a possible Colonial slave settlement, site 38CH2089 is likely related – possibly representing an overseer or slave driver – although the current level of investigation is not sufficient to ascribe a function. The abundance of brick, for example, suggests a more substantial structure than is typically associated with slaves and there is a notable resemblance to investigation of the overseers' sites at 38BK1900 (Trinkley et al. 2003) and 38CH1278 (Trinkley et al. 2005).

Figure 88. View of oak tree at 38CH2089.


Figure 89. View of the boiler.

Like 38CH2088, this site has been affected by logging, however, the site appears to have a distinct nucleus suggested by the abundance of brick in a 100 square foot area. While no whole bricks were found, some of the fragments were still large for this age of a site (measuring about 1/3 the size of a full brick), giving a high potential for intact features and thus the potential to address significant research questions. The concentration of remains also suggests that there has been little dispersion by logging or other recent cultural activities. One large oak tree is also located in the vicinity of the site (Figure 88).

Site 38CH2089 is recommended as potentially eligible for the National Register. Additional testing, to consist of perhaps 10-20 foot testing combined with at least two 5-foot units, is needed to make an informed determination of eligibility.

Isolated Finds

Only one isolated find was identified on the property – an abandoned boiler section. It is found at the end of what is known as "Boiler Road," at UTM 582185E 3634492N (NAD27 datum) in an area of heavy woods. The 1918 Ravenel topographic map (Figure 8) shows a structure in this immediate area, perhaps a building containing the boiler or the boiler tender's house. Regardless, the area today is surrounded by mine pits, leaving the boiler standing on a small, isolated area of high ground. No other remains were found.

The boiler measures about 10 feet in height and 6 feet in diameter (Figure 89) and is made from riveted sheets of iron. Boilers, of course, were closed vessels used for the generation of steam from water, with the steam then used to produce power for various applications. Boilers, however, consisted not only of the vessel (seen here), but also a furnace. No evidence of the furnace remains today. Assuming the boiler is in its original location, it would have been a vertical design, similar to a Davy-Paxman boiler, shown here as Figure 90. In such cases the fire box or furnace would be below the tank. Missing is this furnace, as well as the stack and all of the internal and external components (such as water and pressure gauges).

The boiler tank, stripped of other components, can provide little information and is not considered eligible for inclusion on the National Register.

Architectural and Other Historic Resources

No historic properties noted in the 1992 Charleston Survey (Fick 1992) were found in the project APE. This portion of Charleston County is being quickly developed into neighborhoods and commercial properties. While not identified as part of the architectural and historical survey, several properties are worth mentioning.

Bulow Battery

The Bulow Battery, a Civil War earthwork forming part of Charleston defense, is mentioned only twice in the *Official Records*. In March 1863 it was noted that the fort, designed to mount four guns, had none (*OR* 20, p. 808). About the same time an inquiry was made "whether or not the bridge over Rantowles Creek opposite Bulow's is in a serviceable condition" (*OR* 20, p. 842).

The Bulow Battery has been searched for but not identified in a county-wide study (Trinkley and Fick 2000) and its location as shown on the State Historic Preservation Office GIS is only approximate (see Figure 7 for its historic depiction). We have recently been told that the battery location is on a conservation easement off the project tract (Bill Thomas, personal communication 2006) . In fact, this posited location cannot be seen from the study property and is entirely shielded by dense forest vegetation. A far greater threat to the battery are the metal detector enthusiasts presently looting the site.

Thus, while the battery may be eligible for inclusion on the National Register of Historic Places under Criteria A (important events) and D (research potential), it will not be affected by the proposed developments on the Campbell tract and is, in fact, in much greater proximity to developments already approved by the State Historic Preservation Office (see, for example, Sipes and Hendrix 2002).

Bulow Mine Tram Roads

The historical context provides considerable information on the importance of rail lines to the mining of phosphate, noting that they were used to transport the mined rock from the pits to the washers and occasionally from there to various shipping points. Tram lines were also used by the steam shovels when they were employed for mining. The presence of locomotive engineers, fire men, and track men in the historic accounts all provide evidence of the importance of tram roads to the development of phosphate mining. At least one period map (Figure 8) shows tram roads throughout St. Andrews Parish.

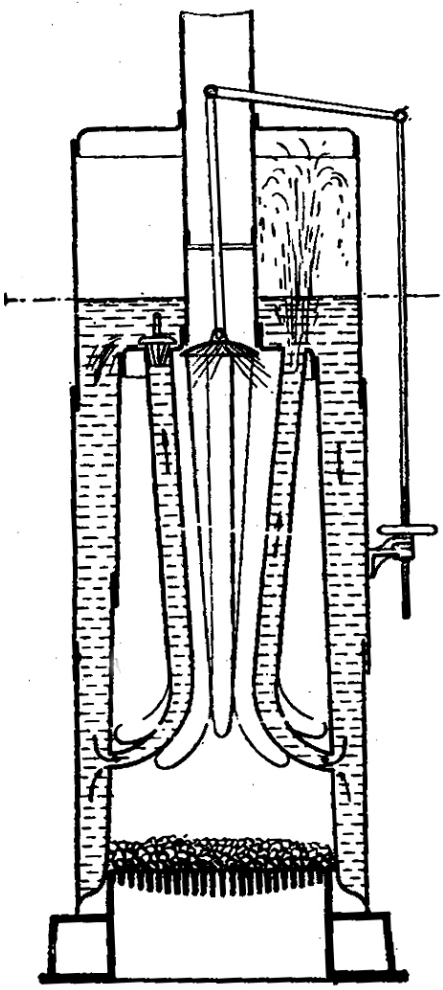


Figure 90. Sectional view of a Davey-Paxman vertical boiler (adapted from Benjamin 1893:Figure 389).

One characteristic of these trams roads, however, was their temporary nature. As areas were mined out, there would be no need for a tram, the track would be removed, and a new tram laid elsewhere. Given the low demand placed on these roads relatively light weight tract was used and it is likely that the beds received far less work than would be necessary for more permanent and more frequently used rail lines. Phosphate work tram roads, by their nature, were somewhat ephemeral.

Figure 91. View of a portion of rail line.

During this investigation an occasional rail was observed, but they all appeared to be displaced. For example, a 15 foot section of rail was found along Bear Swamp Road, which never had a tram as far as we can determine. In addition, the few pieces of rail that we observed appeared to be at locations where bridges were used over wetland (Figure 91), possibly suggesting the re-use of the rail as a support for the bridge after the tract was no longer being used for phosphate mining. Rail was so common during its period of use it was even incorporated into period chimneys.

For at least 50 years, the rails have been gone, leaving the tram roads to be used as roads for cattle ranching and in more modern times as ATV trails for hunters. Most of the tram roads (Figure 92) possess no distinctive characteristics (no elevation or

Figure 92. View of tram road showing no distinct characteristics.

Figure 93. View of preserved tram road.

ditching, for example), appearing today as nothing more than perhaps dirt logging roads. The segments lack association, integrity, and feeling. They are clearly not eligible for inclusion on the National Register of Historic Places.

In spite of this assessment, we note that several segments of tram roads running through wetlands on the tract will be preserved by the proposed development plan. In these areas the tram roads are slightly elevated above the wetlands and in some areas ditching is still intact (Figure 93).

Figure 94. View of mine pits in the project area.

Figure 95. View of mine pits in the project area.

Mine Pits

Also unique to the tract are the multitude of distinct mine pits (Figures 94 and 95). Again, while providing documentation of a significant historical theme, these features provide little information beside what type of mining took place and its impact on the natural environment. For example, on the study tract there are areas that exhibit the differences between hand mining at relatively shallow depths and the mining using power equipment that is, in essence, strip mining.

Nevertheless, many of the pits – most especially those associated with later power equipment, are now wetlands and are unsuitable for development. Many are going into conservation ease-ments for long-term pres-ervation.

Rice Fields and Water Sources

Another interesting feature of the project tract is the historic rice fields located in the western portion of the property (Figure 96). While the 1872 plat of the property does show a slave settlement, it is somewhat far from these fields. Sites 38CH2088 and 38CH2089, possible slave settlements, are much closer to these old rice fields.

Figure 96. View of historic rice fields in the western portion of the tract.

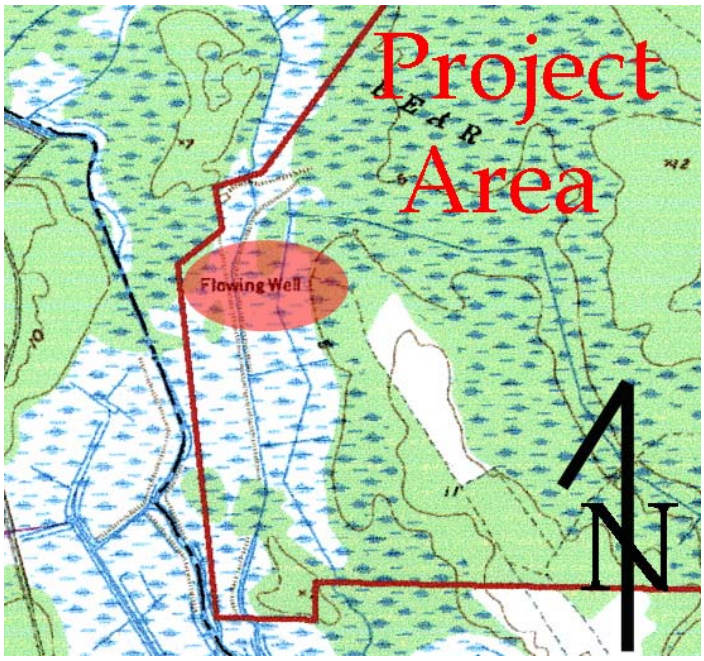


Figure 97. Topographic map showing the "Flowing Well."

Although focal points for historic settlement, these fields retain very few characteristics that could identify them as historic rice fields. Today they appear to be only typical coastal marsh land.

The modern topographic map does show a "flowing well" within the marsh (Figure 97). We found the well, which was only identifiable by an over flow of water from the ground (Figure 98). We have no other sources that indicate if, how, or when this well was used. Unlike man-made wells, it is unlikely that artifacts would be found in an artesian well since water is constantly pushing up to the ground surface. It is unlikely that this well would be able to address any research questions.


Figure 98. View of the flowing well.

Survey Markers

Finally, the use of granite monuments to mark the boundaries of the project tract was observed (Figure 99). The 2005 Wetland Survey Map of the tract recorded 17 separate monuments, which are marked with the roman numerals "XIII." The 1872 plat (Figure 39) fails to identify boundary marks and the stones are not shown on plats until the 1948 plat showing the transfer of the property from Bradley Realty Corporation to C.P. Cuthbert (Charleston County RMC, PB G, p. 58).

These stones, representing the legal boundary marks for the property, will be left in place and will not be affected by the development activities.

Figure 99. View of a granite monument.

CONCLUSIONS

This study involved the examination of a tract of approximately 3,000 acres in Charleston County be used for a neighborhood of single family homes. This work, conducted for Mr. Walt Martin of Associated Developers, Inc. examined archaeological sites and cultural resources found in the proposed project area and is intended to assist Long Savannah Plantation, LLC in complying with their historic preservation responsibilities.

Table 20.
Summary of Sites

Site Number	Type of Site		UTM	Eligibility
38CH2025	Cemetery		579625E 3632423N	Eligible
38CH2081	19th-20th C. Mining Settlement			Potentially Eligible
		Structure A	581507E 3631981N	
		Structure B	581401E 3632031N	
		Structure C	581247E 3632089N	
		Structure D	581127E 3632097N	
38CH2082	19th-20th C. Structure		581897E 3631454N	Not Eligible
38CH2083	18th-19th C. Structure		582207E 3633473N	Not Eligible
38CH2084	19th-20th C. Mining Village			Potentially Eligible
		Structure A	581681E 3633292N	
		Structure B	581681E 3632682N	
		Structure C	581718E 3632738N	
		Structure D	581715E 3632800N	
		Structure E	581776E 3632914N	
		Structure F	581765E 3632936N	
		Structure G	581772E 3632991N	
		Structure H	581798E 3633056N	
		Structure I	581807E 3633151N	
		Structure J	581745E 3633207N	
		Structure K	581812E 3633292N	
		Structure L	581805E 3633338N	
		Structure M	581785E 3633482N	
		Structure N	581806E 3633624N	
38CH2085	Late 19th C. Structures			Potentially Eligible
		Structure A	582089E 3632736N	
		Structure B	582113E 3632741N	
		Structure C	582126E 3632717N	
38CH2086	18th-19th C. Structure		580519E 3632795N	Not Eligible
38CH2087	19th-20th C. Structure			Potentially Eligible
		Structure A	580798E 3632790N	
		Structure B	580670E 3632788N	
38CH2088	18th C. Slave Settlement		579843E 3632319N	Potentially Eligible
38CH2089	18th C. Settlement		579643E 3632647N	Potentially Eligible

As a result of this investigation, ten archaeological sites (38CH2025 and 38CH2081-2089) were identified (Table 20). Site 38CH2025 is the Bulow Cemetery, which is recommended eligible for the National Register. Site 38CH2081 consists of the remains of structures associated with the nineteenth to twentieth century Bulow Mines that is potentially eligible for the National Register. Site 38CH2082 is the remains of nineteenth to twentieth century structures that is recommended not eligible for the National Register for its lack of integrity and inability to address significant research questions. Site 38CH2083 consists of remains dating from the eighteenth to nineteenth century that is recommended not eligible for the National Register for its lack of integrity. Site 38CH2084 is the nineteenth to twentieth century mining village associated with the Bulow Mines and is potentially eligible for the National Register. Site 38CH2085 consists of the remains of late nineteenth century structures that are potentially eligible for the National Register. Site 38CH2086 are the remains of an eighteenth to nineteenth century settlement that is recommended not eligible for the National Register for its lack of integrity and sparse remains. Site 38CH2087 is a nineteenth to twentieth century domestic site that may be related to the Bulow Mines and is potentially eligible for the National Register. Sites 38CH2088 and 38CH2089 are eighteenth century settlements that are potentially eligible for the National Register.

Additional testing should be performed at 38CH2081, 38CH2084, 38CH2085, 38CH2087, 38CH2088, and 38CH2089 to determine eligibility for the National Register of Historic Places.

A survey of public roads within 0.5 mile confirmed the findings of the 1992 county-wide survey (Fick 1992). No structures were found in the project APE. The Bulow Battery cannot be seen from the project area and will not be impacted by the current undertaking.

It is possible that archaeological remains may be encountered during construction activities. As always, contractors should be advised to report any discoveries of concentrations of artifacts (such as bottles, ceramics, or projectile points) or brick rubble to the project engineer, who should in turn report the material to the State Historic Preservation Office, or Chicora Foundation (the process of dealing with late discoveries is discussed in 36CFR800.13(b)(3)). No further land altering activities should take place in the vicinity of these discoveries until they have been examined by an archaeologist and, if necessary, have been processed according to 36CFR800.13(b)(3).

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Archaeological Investigations

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Chicora Foundation, Inc.
PO Box 8664 ▪ 861 Arbutus Drive
Columbia, SC 29202-8664
Tel: 803-787-6910
Fax: 803-787-6910
Email: Chicora@bellsouth.net
www.chicora.org